RAILROAD GAZETTE

FRIDAY, JUNE 6, 1879.

Wear of Steel Rails on the Atlantic & Great Western Railroad.

[An investigation into the comparative wear of the various brands of steel rail laid on the road, as affected by grades and curvature. Made under the direction of Charles Latimer, Chief Enneer, by A. M. Wellington, C. E.]

The following investigation was undertaken as a continuation of similar tests made some two years since by H. C. Thompson, Assistant Engineer, and published in the "Report of the Road-Masters' Meeting" of the Atlantic & Great Western Railroad on Oct. 26, 1876, and also in the *Railroad Gazette* of March 16, 1877.

It has been designed to determine so far as might be

1. *The comparative wear of rails of various makes.*
2. *The probable average life of steel rails.*
3. *The increase of wear due to grades and curvature.*
4. *The increase of wear due to speed, irregularities of surface, etc.*

For the purpose of getting an accurate section of the rail which should fairly represent its average form, a simple machine was constructed (shown in fig. 1) for obtaining sections of the rail at any point of its length. It is very easily used, as explained beneath the figure, and fulfills its purpose perfectly. *

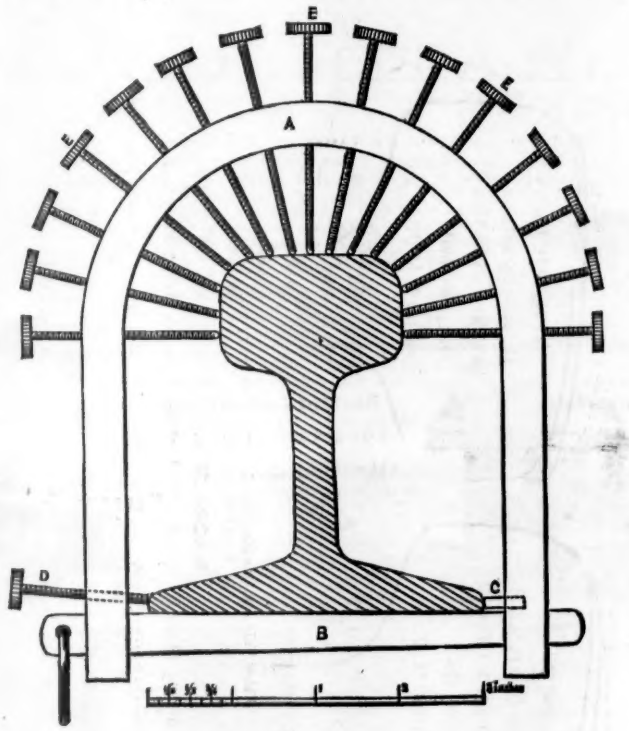


Fig. 1.

Machine for Taking Rail Sections. Designed by A. M. Wellington, C. E.

EXPLANATION.—The yoke *A* is ½ inch square carrying the set screws *E*. To use the instrument, the beveled key *B* is removed, the set screws *E* turned well back, the instrument placed over the rail, and the key *B* replaced. One of the set screws *E* is then screwed up to a bearing and the base is confined between the peg *C* and the set screw D. The other set screws are then brought to a bearing, when by removing the key *B* the instrument can be taken off the rail. By replacing the bar *B* and replacing the instrument on a suitably shaped pad, the correct position for the base of the rail and the exact form of the worn head can be laid off. The original section is then laid off from a template.

Sections were also traced off directly from the ends of each rail. The fact was thus developed that end sections are quite unreliable as a guide to the average wear, the joint being *invariably* more worn than at any other point. Diagrams A show a series of sections giving a comparison of these end and mid-sections, for all but one or two of which the joints were *apparently* worn perfectly even with the rest of the rail. No difference in respect to this wear at joints could be detected between the various joints in use. The Fisher & Norris, Atlantic & Great Western double joint (which may be described as a combination of a plain fish-plate with a Dilworth & Porter suspended joint), and plain steel and iron fish-plates compare equally well with each other in this respect, so far as could be observed.

This increase of wear, however, does not, with rare exceptions, degenerate into a battered joint, but after reaching a certain depression in the joint the wear continues about uniform. The same is true in great degree of blemishes which develop in the middle of the rail. Several were pointed out which were stated to have been in worse condition several years ago than now.

In addition to taking sections as above, all rails tested were taken out of the track and weighed, a portable tripod and steelyard being used for that purpose. Two rails, opposite to each other, were taken out as a rule, both on curves and on tangents, and in some cases four or more. The number of rails tested on curves was 75, on tangents 57, and at points of reversed curvature 8, or 140 in all. The results will be found embodied in Tables 1, 2 and 3 herewith, reduced to a uniform duty of 10,000,000 tons for purposes of comparison.

Three causes have prevented that full precision in the results shown in the table which is desirable.

1. The original weights per yard could not be exactly ascertained, except in three or four instances. A close approximation was possible for the American steel by ascertaining the average weight of the original car-load. For the English steel this could not be done, but it was ascertained from the records that it fluctuated in weight much less than the C. R. M. Co. American steel and averaged exactly 66 lbs. per yard. To determine the probable fluctuations in individual rails, 17 new rails out of various lots of one month's rolling were weighed, with the following result:

1 rail	weighed	60.5	lbs.	per	yard.
2 "	"	60.6	"	"	"
3 "	"	60.7	"	"	"
1 "	"	60.8	"	"	"
3 "	"	60.9	"	"	"
3 "	"	61.0	"	"	"
2 "	"	61.1	"	"	"
17 rails averaged		60.85	"	"	"

This difference in weight is due, first, to a difference in temperature of the rail, and, secondly, to a difference in the setting of the finishing rolls, which are not in contact with each other but separated by as much as ¼ inch or more. This difference in weight inevitably leaves a considerable margin of error on each individual rail (decreasing in importance as the wear is greater), but it should have little influence upon the average. One purpose of the investigation, however, was to leave a foundation by which more accurate investigations may be made in the future, each rail taken up having been branded with a number and its weight recorded.

2. Varying conditions of speed, ballast, use of brakes, and especially use of sand, greatly modify the wear and cannot always be exactly estimated or recorded. The elevation and alignment, also, have often, perhaps usually, been more or less changed since the rail was laid. The quality of individual rails often varies greatly, so as to leave it doubtful whether the difference in weight be due to an original difference or a difference in wear.

3. The tonnage over the standard-gauge track of the Mahoning Division could not be exactly ascertained, owing to the fact that an unknown proportion of the car tonnage (averaging about one-fourth) passes over the broad gauge or "straddle" track. It is believed that a close approximation has been made from the records of the Car Accountant's office. For some of the rails tested, also, it was necessary to make an approximate estimate of the addition to the regular tonnage by switching, which was done with great care.

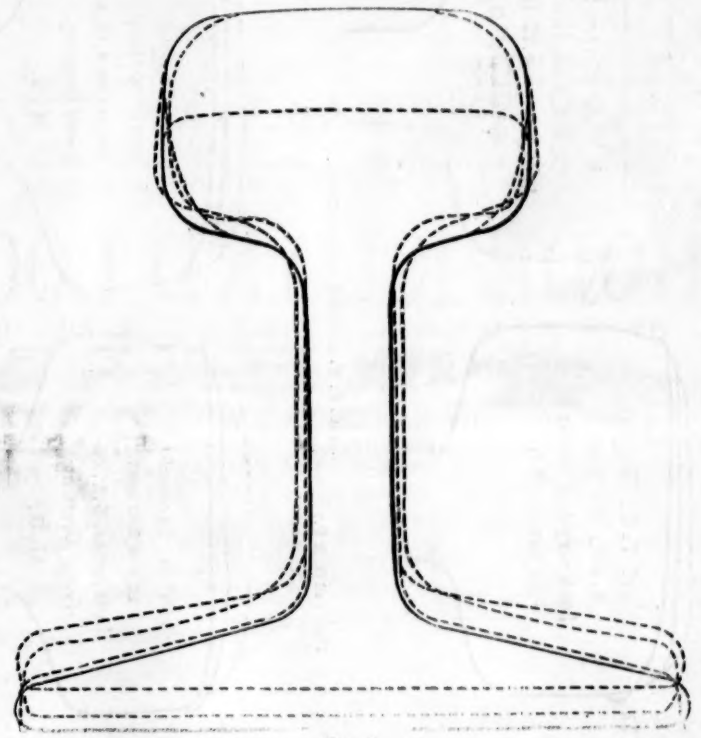


Fig. 2.

Showing the four principal Patterns of Steel Rails in record on the Atlantic & Great Western Railroad and the assumed limit of safe wear for the pattern of 1877—⅝ inch in height and 14 lbs. in weight.

A. & G. W. R. R. Pattern of 1877	60.4 lbs. per yard.
" " " " 1873	60.4 " "
Ebbw Vale English Steel	66.0 " "
Dowlais	56.0 " "

DISTRIBUTION OF WEIGHT IN ABOVE PATTERNS.

Pounds per yard.

	A. & G. W. R. R. Pattern of 1877.	A. & G. W. R. R. Pattern of 1873.	Ebbw Vale.	Dowlais.
Head	30.0	27.0	28.1	25.7
Neck	10.0	11.4	12.3	11.0
Base	20.4	22.0	25.6	19.3
Total	60.4	60.4	66.0	56.0

CONCLUSIONS.

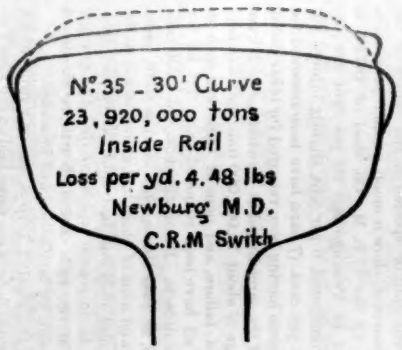
1. *Comparative Wear of Various Brands.* — Table 4 gives an abstract of the relative wearing qualities of the various brands from which it appears that, as respects *loss of weight* in service, the C. R. M. Co. rail of 1874-75 is noticeably better (about as 6 to 10) than either of the English steels or the C. R. M. Co. rails of 1877-8; these latter being approximately equal. Table 5 gives an abstract of BROKEN RAILS of each brand, as well as of various iron and steel-top rails, from which it appears that the C. R. M. Co. rails have a much better record than the English rails in this respect also, the relative number of bars broken per mile per year being as 0.34 to 0.75. This difference, however, is somewhat deceptive, owing, first, to the fact that the English rails were punched instead of drilled, and secondly, to difference in joints, the English having a plain fish-plate and the C. R. M. Co. steels a combined fish-plate and Dilworth & Porter joint, or the angle fish-plate. *Per contra*, a very large number of the English rails have failed at the joints which have not been reported as broken rails, and they appear to be very noticeably more liable to split off on the side.

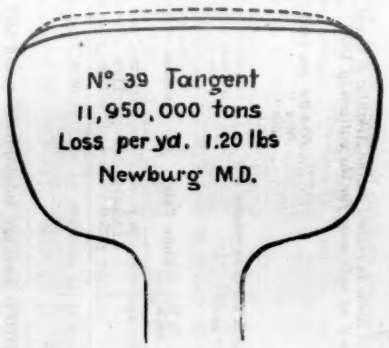
Comparing the breakages of the steel rails in general with those of iron rails, it is noticeable that, contrary to a general impression, they appear to be much less liable to break than iron rails, the reported breakages being, on an average, five times as numerous for iron and steel-top rails as for steel. It will also be noticed that the table appears to afford considerable support to the theory that the number of breakages increases with age.

As respects the proportion of defective rails now in the track, it may be stated as an average of several counts that about 80 per cent. of the Ebbw Vale and Dowlais steel (average tonnage 18,000,000 tons) are substantially sound and uninjured; about 15 per cent. more or less injured at joints, and about 5 per cent. split or spotted in the centre of the bar. Some lots, however, show a much greater proportion of injured rails. Of the C. R. M. Co. steel of 1874-5 it appears by a count at Venango that 95 per cent. are perfectly sound and uninjured, 6 per cent. slightly injured but serviceable, and 3 per cent. (7 bars) have been removed for defects at joints, none having been removed for other cause. Out of 326 rails of the same brand at Newburg, which have sustained a tonnage of about 12,000,000 tons, only five bars show any signs of failure, and none of these are serious. About 10 bars in all have been removed from this lot for breakages or other defects. By another count of 1,760 rails of the same brand, at Red House, only 25 rails were found slightly battered (and none of these had grown worse in the past two years), and only one had split off on the side. Altogether, there is no reason to believe that the average life of the C. R. M. Co. rails of 1874-5 will be shortened *more* than 5 per cent. by lamination and breakage.

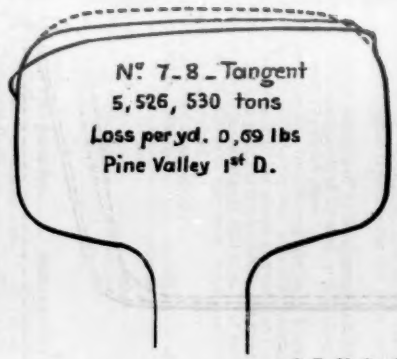
Of the C. R. M. Co., steel of 1876-8, the only rails which show any considerable defects are those laid on the Pine Valley 8° reversed curves, on a 60-ft. grade. These rails appear, by some chance, to have been an exceptionally soft lot, and have flattened out on the *inside joints only*, in a

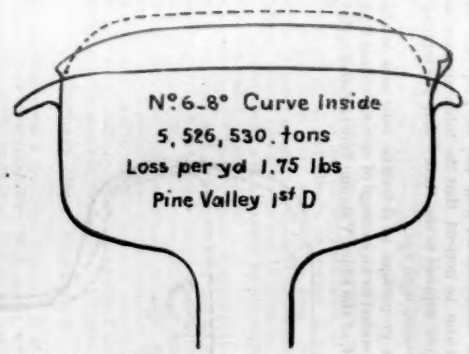
* Duplicates of this machine can be obtained by any one wishing them of K. E. Kritch, No. 42 S. Water Street, Cleveland, for $7.50 each. For a slight additional expense a micrometer gauge may be attached to one or more of the screws, to give more accurate readings of wear on top.



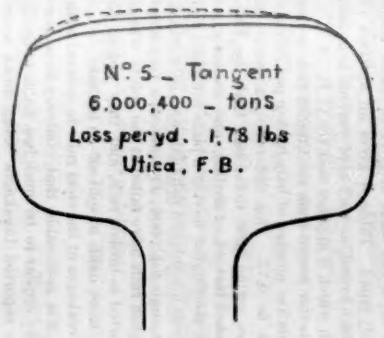


C. R. M. Co. Steel, Pattern of 1873. Average, 60.4 lbs. per yard.
A. & G. W. Double Joint. (Fish-Plate and D. & P.)

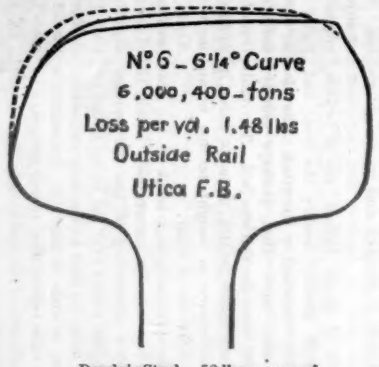


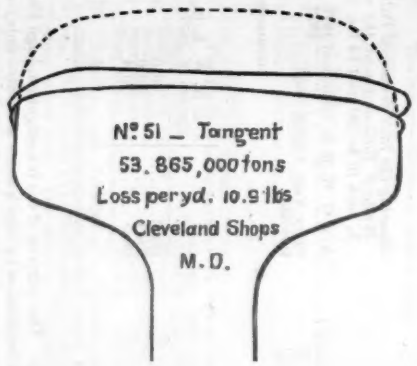


C. R. M. Co. Steel, Pattern of 1877.



Dowlais Steel, 56 lbs. per yard.
Fisher & Norris Joint.





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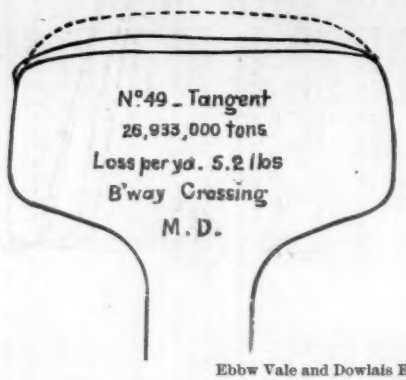
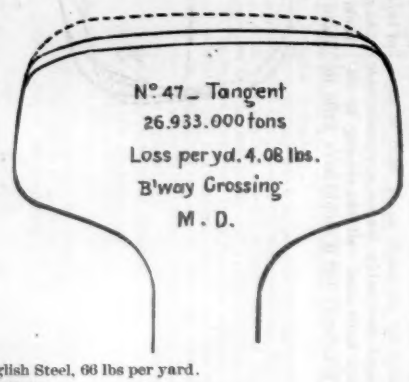
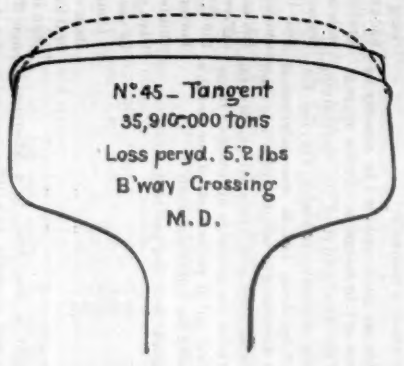
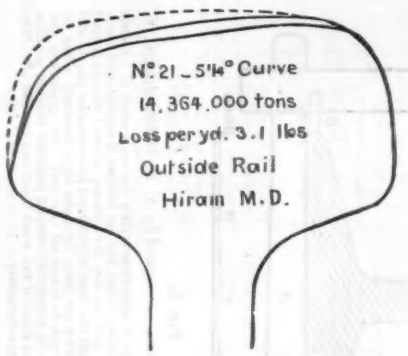
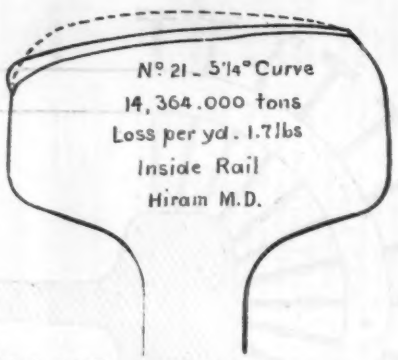






Ebbw Vale and Dowlais English Steel, 66 lbs per yard.
Steel Fish-Plates.





Ebbw Vale and Dowlais English Steel, 66 lbs. per yard.
Steel Fish-Plates.

DIAGRAMS A.

Illustrating the difference in the Wear of Steel Rails at Joints and in the middle of the bar.

The upper line in all cases represents the middle sections of the rail and the lower line the end section. In all the above sections, with two exceptions, the difference in the wear at joints could not be observed by the eye without close inspection. The left of the section is the inside or running edge in all cases.

TABLE 1.

Showing the Wear of Steel Rails of Various Brands Laid on Various Curves of the Atlantic & Great Western Railroad, as Determined by Weighing Each Rail

Nos. of rails. Outside	Nos. of rails. Inside	Brand of rails.	Original weight per yard	Date of laying.	Mile post	Nearest station.	Division	Grade, ft. per mile	Degree of curve	Av. speed, miles per hour	Total wear. Lbs. per yd. Outside	Total wear. Lbs. per yd. Inside	Total tonnage over rail	Wear per 10,000,000 tons tonnage. Outside	Wear per 10,000,000 tons tonnage. Inside	Wear per 10,000,000 tons tonnage. Average	Wear by deduced formula	Remarks.
GENERAL AVERAGE ON TANGENTS (see Table 2)																**0.92**	1.00	
.....	42	Ebbw Vale, '71	66.0	3-'72	31⅛	Broad'y Crossing	Mah.	60	0° 15′	10	.....	6.00	35,910,000	.....	1.67	.....	.....	Sand used freely.
16	17	" " "	66.0	5-'72	35½	Hiram	"	20	0° 30′	20	1.29	0.64	14,364,000	0.90	0.45	0.67	.....	
35	36	C. R. M. Co., 10-'74	62.88	10-'74	6½	Newburg	"	61	0° 30′	17	2.78	4.48	23,920,000	1.16	1.87	1.51	.....	Sand used freely.
4	3-5	Ebbw Vale, '71	66.0	5-'72	33⅛	Hiram	"	20	1°	20	1.20	1.50	14,364,000	0.84	1.04	0.94	.....	End of an 8° curve.
37	.....	C. R. M. Co., 8-'77	59.77	8-'78	89⅜	Cambridge	1st	25	1°	20	0.23	.....	1,932,200	1.18	1.10 ?	1.08	.....	
7	8	Dowlais, '71	66.0	2-'72	128	Greenville	2d	30	1°	23	2.37	2.00	17,433,300	1.36	1.11	1.24	.....	
31-32	23-24-25-26-27	Ebbw Vale, 10-'71	66.0	1-'72	67¼	Concord	1st	20	1° 30′	23	2.50	2.56	20,574,800	1.21	1.25	1.23	.....	
GENERAL AVERAGE									**1°**					**1.10**	**0.99**	**1.04**	1.03	
21-22	23-24	C. R. M. Co., 5-'75	61.10	5-'75	7	Red House	1st	Lev	2° 30′	22	0.40	0.24	11,819,800	0.34	0.21	0.28	.....	
38	39	"	60.66	7-'75	91½	Venango	"	"	2° 30′	20	2.06	1.20	11,259,800	1.69	0.98	1.34	.....	
40	41	"	60.66	7-'75	92	Venango	"	"	2° 30′	20	1.20	0.32	11,259,800	1.09	0.30	0.70	.....	
7	6	Ebbw Vale, '71	66.0	5-'72	33⅛	Hiram	Mah.	20	3°	20	2.00	3.40	14,364,000	1.40	2.37	1.89	.....	
32	33	C. R. M. Co., 10-'74	62.88	10-'75	6½	Newburg	"	61	3°	12	2.14	2.47	14,516,100	1.48	1.70	1.59	.....	Sand used.
10	11	Ebbw Vale, '71	66.0	5-'72	38¼	Garrettsville	"	20	3° 15′	10	3.40	1.50	14,364,000	2.37	1.04	1.70	.....	At station.
3	4	"	66.0	11-'71	51½	Bear Lake	1st	49	3° 30′	15	2.88	1.78	21,050,800	1.40	0.87	1.14	.....	
GENERAL AVERAGE									**3°**					**1.40**	**1.07**	**1.23**	1.27	
9-10	11-12	Ebbw Vale, 10-'71	66.0	5-'72	1	Salamanca	1st	Lev	4°	15	5.59	4.25	23,136,000	2.42	1.84	2.13	.....	
40	41	C. R. M. Co., 10-'74	61.50	10-'74	5½	C. & P. Crossing	Mah.	60	4°	5	0.97	2.04	11,950,000	0.81	1.70	1.25	.....	All trains north stop on these rails.
43	44	Ebbw Vale, 10-'71	66.0	3-'72	3½	B'way Crossing	"	60	4°	13	6.25	6.40	35,910,000	1.74	1.78	1.76	.....	
GENERAL AVERAGE									**4°**					**1.66**	**1.77**	**1.71**	1.48	
13-14	15-16	Ebbw Vale, '71	66.0	5-'72	1	Salamanca	1st	Lev	5°	15	4.31	2.04	21,814,000	1.99	0.94	1.47	.....	
13	12	"	66.0	5-'72	38¾	Garrettsville	Mah.	20	5° 15′	23	4.50	3.00	14,364,000	3.13	2.09	2.61	.....	
21	20	"	66.0	5-'72	35½	Hiram	"	20	5° 15′	16	3.10	1.70	14,364,000	2.16	1.18	1.67	.....	
14	15	"	66.0	5-'72	35½	Hiram	"	20	6°	20	3.48	3.09	14,364,000	2.42	2.15	2.28	.....	
6	7	Dowlais, '71	56.0	3-'72	15	Utica	F. B.	30	6° 15′	18	0.89	0.82	6,000,400	1.48	1.37	1.43	.....	
34	35	C. R. M. Co., 10-'74	60.85	10-'74	6½	Newburg	Mah.	61	6° 15′	14	1.75	1.75	11,516,000	1.52	1.52	1.52	.....	Sand used.
GENERAL AVERAGE									**5° 45′**					**2.12**	**1.54**	**1.83**	2.00	
1-2	3-4	Dowlais, '71	66.0	2-'72	128¼	Greenville	2d	30	7° 40′	23	8.30	4.42	17,433,300	4.75	2.53	3.64	.....	Removed from curve to a tangent June, 1877. Estimated tangent wear deducted.
1	2	"	66.0	11-'71	52¾	Bear Lake	1st	35	8°	15	3.86	4.54	15,429,300	3.16	2.94	3.05	.....	
5	6	C. R. M. Co., 6-'77	59.2	6-'77	52⅛	"	"	35	8°	15	1.45	1.75	5,526,530	2.62	3.18	2.90	.....	
.....	9-10-11	"	59.2	6-'77	52¾	"	"	35	8°	15	.....	1.10	5,526,530	.....	2.00	.....	.....	Broken rails. Pine Valley curves. A good deal of sand is used on the curves, but the speed is quite moderate in both directions.
16	17	"	59.2	6-'77	53	"	"	64	8°	15	1.60	1.20	5,526,530	2.91	2.18	2.55	.....	
19	20	"	59.2	6-'77	53⅛	"	"	64	8°	15	2.10	1.08	5,526,530	3.82	1.97	2.88	.....	
GENERAL AVERAGE									**8°**					**3.45**	**2.56**	**3.00**	2.92	
1	2	Ebbw Vale, 1-'71	66.0	3-'72	25¼	Franklin	F. B.	Lev	12°	12	4.15	2.55	6,000,400	6.92	4.25	5.58	.....	
3	4	"	66.0	3-'72	25⅓	"	"	"	16°	12	7.80	1.45	6,000,400	13.00	2.42	7.71	.....	
GENERAL AVERAGE									**14°**					**9.96**	**3.33**	**6.64**	6.88	

The number of rails are not consecutive, but begin at 1 on each road-master's division

The average speed is estimated as being higher or lower than the general average (for all trains) of 20 miles per hour.

The degree of the curve was determined by taking an ordinate to a chord at the centre of the rail taken up.

The elevation of outer rail was determined by a level in each case, and with one or two unimportant exceptions was ¾ inch per degree of curvature on the main and Franklin Branch (6 feet gauge) and ½ inch per degree of curvature on the Mahoning Division (4 ft. 8½ in. gauge). As the elevation is very liable to have changed during the life of the rail, it has not been deemed necessary to encumber the above table with further details.

The formula for rail wear on curves as deduced from the above table is—*Extra wear due to curvature on a d° curve in lbs. per yd. per* 10,000,000 *tons duty* $= 0.03d^2$.

TABLE 2.

Showing the Wear of Steel Rails Laid on Tangents of Various Grades on the Atlantic & Great Western Railroad, as Determined by Weighing Each Rail.

Nos. of rails.	Brand of rail.	Original weight per yard	Date of laying	Mile post	Nearest station.	Division	Grade, feet per mile	Av. speed, miles per hour	Total wear, Lbs. per yard	Total tonnage over rail.	Wear per 10,000,000 tons. Lbs. per yard	Remarks.
33-34	Dowlais, '71	66.0	1-'72	68	Concord	1st	Level	23	1.71	20,574,800	0.82	
1-2-3-4	Ebbw Vale, '71	66.0	5-'72	1	Salamanca	"	"	8	2.26	26,441,000	0.85	
5-6-7-8-9-10	"	66.0	5-'72	0⅞	"	"	"	6	2.13	24,788,000	0.85	
17-18-19-20	"	66.0	5-'72	1⅛	"	"	"	10	1.00	19,851,000	0.51	
35-36	Dowlais, '71	66.0	1-'72	68	Concord	"	"	20	1.71	20,574,800	0.44	
25-6-7-8	C. R. M. Co., 5-'75	61 10	5-'75	7½	Red House	"	"	20	0.19	11,819,800	0.16	
47-48	Ebbw Vale, '72	66.0	3-'72	2⅜	B'way Crossing	Mah.	14	10	4.08	26,933,000	1.51	Sand used freely.
49-50	"	66.0	3-'72	2¾	"	"	14	10	5.20	26,933,000	1.94	" " "
51-2-3	"	66.0	3-'72	2	C'l'd Shops	"	14	6	10.90	53,865,000	2.01	" " "
30-31	"	66 0	3-'72	13	Randall	"	20	18	2.35	14,364,000	1.63	
1-2	"	66.0	5-'72	34	Hiram	"	20	20	2.75	14,364,000	1.92	These rails are of the same make, and the difference in wear cannot be explained, unless by the fact that the most worn are at the mouth of a cut and the least worn on a fill.
8-9	"	66.0	5-'72	33¾	"	"	20	20	0.90	14,364,000	0.63	
28-29	B. V. & Co. (E. V.)	66.0	5-'72	13⅝	Randall	"	20	22	1.30	14,364,000	0.90	
38-39	C. R. M. Co., 10-'74	63.3	10-'74	6	Newburg	"	20	14	1.20	11,950,000	1.00	Sand used.
28-29-30	Ebbw Vale, 10-'71	66.0	1-'72	67¼	Concord	1st	20	23	2.30	20,574,800	1.11	
22-3-4-5	B. V. & Co	66.0	5-'72	14⅛	Randall	Mah.	20	24	0.80	14,364,000	0.56	These rails are adjacent to each other in the hollow of a grade. The great difference in wear cannot be explained.
26-27	Ebbw Vale	66.0	5-'72	14⅝	"	"	20	24	2.65	14,364,000	1.84	
5	Dowlais, '71	56.0	5-'72	15¼	Utica	F. B.	30	20	0.78	6,000,400	1.30	
5-6	"	66.0	2-'72	128	Greenville	2d	30	23	1.90	17,433,300	1.09	
7-8	C. R. M. Co., 6-'77	59.20	6-'77	52¾	Bear Lake	1st	35	18	0.69	5,526,580	1.24	
42-3-4-5	C. R. M. Co., 5-'75	60.66	7-'75	91¾	Venango	"	50	15	0.75	11,259,800	0.66	At Station.
21-22	Dowlais, '71	66.0	11-'71	53⅛	Bear Lake	"	56	14	2.20	21,050,800	1.05	
45-46	Ebbw Vale, '72	66.0	3-'72	2⅜	B'way Crossing	Mah.	60	..	5.20	35,910,000	1.45	Sand used freely.
AVERAGE OF ALL RAILS ON WHICH SAND WAS NOT USED											0.92	
" " " WAS USED											1.72	
ASSUMED AVERAGE FOR ALL STEEL ON TANGENTS, UNDER ALL CONDITIONS OF WEAR											1.00	

TABLE 3.

Showing the Wear of Steel Rails laid at Points of Reversed Curvature on the Atlantic & Great Western Railroad.

Nos. of rails.	Brand of rail.	Original w't, per yard	Date of laying	Mile post	Nearest station.	Division	Grade, feet per mile	Line.	Total wear, Lbs. per yard	Total tonnage over rail.	Wear per 10,000,000 tons. Lbs. per yard	Remarks.
16-17	Ebbw Vale, '71	66.0	5-'72	35¼	Hiram	Mah.	20	P. R. C. 6°	0.97	14,364,000	0.67	Reversal very sharp at these points, so that the rails were worn as if an outside rail at one end and as if an inside rail at the other.
18-19	"	66.0	5-'72	35¼	"	"	20	" 5°	2.52	14,364,000	1.75	
8-9	Dowlais, '71	56.0	3-'72	15	Utica	F. B.	40	" 6°	1.05	6,000,400	1.75	
14-15	C. R. M. Co., 6-'77	59.2	6-'77	53	Bear Lake	1st	64	" 8°	0.60	5,526,530	1.09	
											1.31	
AVERAGE WEAR ON A TANGENT AS DEDUCED IN TABLE 2											0.92	

very singular manner. Rail No. 6 in Diagram A is a fair sample of these joints. The outside joints show no signs of this defect, nor do the joints on the adjacent tangents. It is difficult to give any sufficient explanation for this difference in wear. The joints are the Atlantic & Great Western standard, a combined fish-plate and Dilworth & Porter; the elevation of the curve (8°) is 6 in., which, assuming the centre of gravity of the car to be 4 feet above the rail, throws exactly 10 tons on the inside rail against 8 tons on the outside, or 9 tons on the rails on tangents, without allowing for any relief to the inside rail from the effect of centrifugal force. Otherwise than at this point the more recent C. R. M. rails show few noticeable defects under the slight tonnage which has so far passed over them. It is plain, however, from the manner in which they "flow" at joints and on the surface, that they can certainly be classed as soft rails, and it is also plain, from Tables 1, 2 and 4 that they do not wear nearly as well as the harder rails of the same make but earlier date, and but little if any better than the English steel on the road, which is the hardest of all. It seems probable, therefore, that there is a medium as respects hardness which affords the most serviceable rail, and that a deviation from it in either direction has an injurious effect. A more extended test of the latter qualities of steel rails will be made next season and report given.

Probable Average Life of Steel Rails.—This depends, first, on the direct loss of weight under traffic; secondly, on the safe limit of wear, and thirdly, on the proportion of rails which it will be necessary to remove from the track before worn out on account of lamination or breakage.

As respects the latter, it seems plain from the facts above detailed, bearing in mind that the great majority of rails classed as defective are defective only at joints, and may be cut off and re-drilled; that the total loss from lamination and breakage cannot well be *more* than 10 per cent. of the ultimate life of all the rails, and possibly much less. This loss, however, including the cost of cutting off, re-drilling and re-laying, might perhaps cause as great an *expense* as if the average life were decreased 20 per cent. During the past seven years less than 1 per cent. of the English steel has been scraped, and much less in proportion of the C. R. M. Co. rails.

Loss of Weight from Wear.—The average wear of all steel rails taken up on tangents, as will be seen in Table 2, was 0.92 lbs. per yard per 10,000,000 tons duty. Some of the most reliable tests in the table, however, as, for example, those for which the original weight was exactly known, showed somewhat above 1 lb. per yard per 10,000,000, which is therefore assumed to be the most correct average for all rails (equivalent to 14,000,000 tons for 1-16 inch wear). Under *favorable* circumstances, or with lots of extra good quality, the wear appears to be but little more than half this.

Comparing this with tests elsewhere recorded, a committee of the American Society of Civil Engineers on the form, weight and life of rails, state (see *Railroad Gazette*, July 25, 1874), that a rail on the Lehigh Valley Railroad, laid on a steep grade for nine years and seven months (weight and make of rail not given), lost 0.3 inch in height and 9.3 lbs. in weight per yard under a duty estimated at 100,000,000 tons. This is equivalent to 0.93 lbs. per yard per 10,000,000 tons, or within one per cent. of the result deduced from Table 2. The committee also state that under the most favorable circumstances the duty per 1/4 inch wear (assumed to be the safe limit) may be taken as 312,500,000 tons, or 19,500,000 tons per 1-16 inch wear (0.72 lbs. per yard per 10,000,000 tons duty), which is a less duty per pound by about 20 per cent. than the C. R. M. Co. rails of 1874-75 have so far sustained. A fair average for a whole road (including both curves and tangents) is taken by the committee at about half this, or 1.44 lbs per yard wear per 10,000,000 tons, which appears to be too unfavorable an estimate (from Table 1) unless the amount of curvature was so great as to average a 4° curve for the entire length of the road, which might be nearly the case on the Lehigh Valley. Other observations by Mr. Ashbel Welch, recorded in the same connection, show a wear varying from 0.56 to 2.48 lbs. per yard per 10,000,000 tons duty, "averaging 1.20 lbs. per yard."

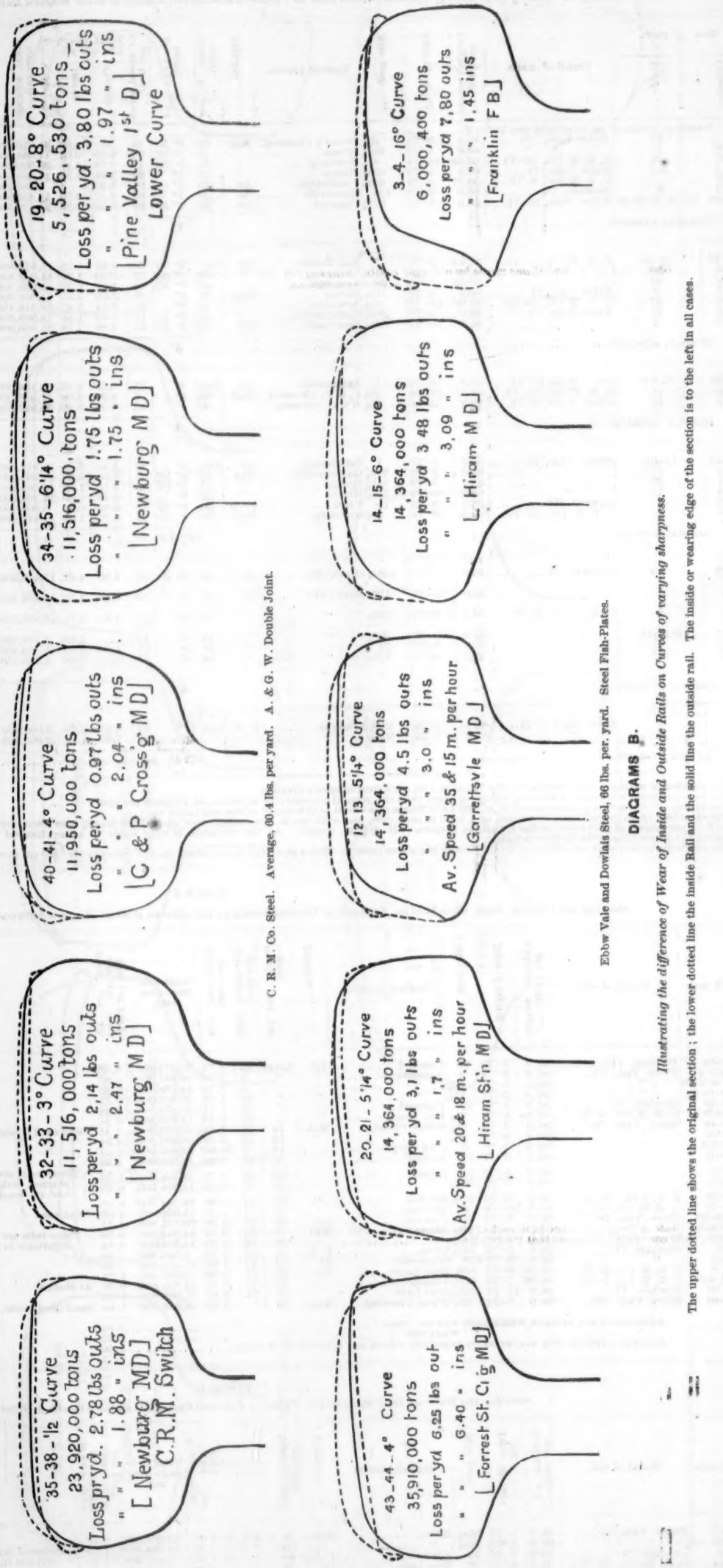
Further comparative figures are given in a recent paper of R. Price Williams, as quoted by Dr. Chas. B. Dudley, of Altoona, Pa.,† as follows:

1 hard rail withstood...	5,251,000	long tons	per 1-16	inch wear.
1 soft " " ...	8,402,000	"	"	"
1 hard " " ...	15,531,000	"	"	"
1 soft " " ...	31,061,000	"	"	"
1 hard " " ...	9,283,000	"	"	"
1 soft " " ...	7,676,000	"	"	"
Average of soft rails..	15,567,000	long tons	per 1-16	inch wear.
" " hard " ..	10,055,000	"	"	"
General average.....	12,811,000	long tons	per 1-16	inch wear.
	14,348,320	net	"	"
	= 0.98 lbs. per 10,000,000 tons (of 2,000 lbs.) duty,			

thus showing almost precisely the same average result as deduced above.

Per contra, in the "Notes of the Models, Charts and Drawings collected by order of the Ministry of Public Works" for the Philadelphia Exposition, it is stated that on the Northern Central Railway of France "all trials" show that steel rails will sustain a traffic of 20,000,000 "tonnes" of 2,204 lbs. per millimetre of wear, equivalent to only 0.4 lb. per 10,000,000 tons (of 2,000 lbs.) duty, or 35,250,000 tons duty per 1-16 inch wear. Such wear can only be paralleled by a few single rails on the Atlantic & Great Western Railroad, of which, however, a few were found which do not appear to

† "Does the Wearing Power of Steel Rails Increase with the Hardness of the Steel?"—*Railroad Gazette*, *January* 24, 1879.


19-20-8° Curve
5,526,530 tons
Loss per yd. 3,80 lbs outs
" " " 1.97 " ins
[Pine Valley 1st D]
Lower Curve
3-4-16° Curve
6,000,400 tons
Loss per yd 7,80 outs
" " " 1,45 ins
[Franklin F B]
34-35-6'14° Curve
11,516,000 tons
Loss per yd 1.75 lbs outs
" " " 1.75 " ins
[Newburg M D]
14-15-6° Curve
14,364,000 tons
Loss per yd 3 48 lbs outs
" " " 3,09 " ins
[Hiram M D]
40-41-4° Curve
11,950,000 tons
Loss per yd 0.97 lbs outs
" " " 2,04 " ins
[C & P Crossg M D]
32-33-3° Curve
11,516,000 tons
Loss per yd 2,14 lbs outs
" " " 2,47 " ins
[Newburg M D]
20-21-5'14° Curve
14,364,000 tons
Loss per yd 3,1 lbs outs
" " " 1,7 " ins
Av. Speed 20 & 18 m. per hour
[Hiram Stn M D]
12-13-5'14° Curve
14,364,000 tons
Loss per yd 4.5 lbs outs
" " " 3.0 " ins
Av. Speed 35 & 15 m. per hour
[Garrettsvle M D]
35-38-1'2 Curve
23,920,000 tons
Loss per yd. 2.78 lbs outs
" " " 1.88 " ins
[Newburg MD]
C.R.M. Switch
43-44-4° Curve
35,910,000 tons
Loss per yd 6.25 lbs out
" " " 6.40 " ins
[Forrest St. Crg M D]

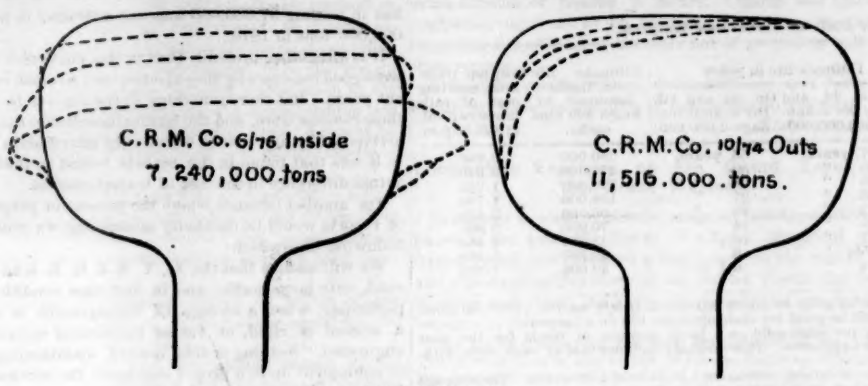
C. R. M. Co. Steel. Average, 60.4 lbs. per yard. A. & G. W. Double Joint.

Ebbw Vale and Dowlais Steel, 66 lbs. per. yard. Steel Fish-Plates.

DIAGRAMS B.

Illustrating the difference of Wear of Inside and Outside Rails on Curves of varying sharpness.

The upper dotted line shows the original section; the lower dotted line the inside Rail and the solid line the outside rail. The inside or wearing edge of the section is to the left in all cases.



DIAGRAMS C.

Showing four Indentations made by a Single Engine slipping her drivers on the 6° curve and 60 feet grade near Newburg Station.

Upper dotted lines show general surface of rail.
Bottom " " " indentations made by front drivers.
Middle " " " " " rear "
Elevation of curve, 3½ inches.

The inside rail was one of more recent rolling which had happened to be substituted for one of the older lot. The difference in the quality is apparent from the different effect of the same cause, or more definitely in the following:

Brand of Rail.	Weight of rail per yard.			Location on curve.	Tonnage.	Loss per 10,000,000 tons.
	Original.	Present.	Loss.			
C. R. M. Co. 10.74.....	60.85	57.85	3.00	Outside.	11,516,000	2.60
" " 6.76.....	60.00	57.20	2.80	Inside.	7,240,000	3.88

Within three or four rails of the above, two other C. R. M. Co. rails of 10-74 were tested (Nos. 34 and 35, Table 1) which show a loss both for inside and outside rail of only 1.75 lbs. per 10,000,000 tons instead of 2.60 lbs., as above, the rails now weighing 59.1 lbs. per yard. No explanation can be given for the difference in wear.

TABLE 4.

Showing the Comparative Loss of Weight in Service of the Several Brands shown in Tables 1, 2, and 3, Abstracted from Tables 1, 2 and 3, and Reduced to the Equivalent Tangent Wear.

Brand of Rail.	No. of bars tested.	Av. tonnage.	Comparative Wear per 10,000,000 Tons. Under average conditions of wear. Average of rails tested on tangents.	Av. of rails on curves equated for tangent wear (see note.)	General average	Under unfavorable conditions, general av.	Character of Steel.
Steel Rails:			Lbs. per yd	Lbs. per yd	Lbs. per yd	Lbs. per yd	
Ebbw Vale '71-2.....	79	18,000,000	1.06	1.10	1.08	1.72	Hard and somewhat brittle.
Dowlais, '71.....	26	18,000,000	0.93	1.07	1.00	....	" " "
C. R. M. Co., '74-5....	26	12,000,000	0.53	0.65	0.59	1.00	Moderately hard; few broken or battered.
C. R. M. Co., '76-8....	14	5,500,000	0.92	1.00	0.98	.....	Comparatively quite soft. See note below.
General average ..			0.92		0.92		
Iron Rails:							
English chair iron....	5	14,300,000	1.73	.....	1.91	.....	A very superior, durable iron. Has lasted far better than any other on the road.
" " (⅜° curve)..	4	14,300,000	.....	2.10		.....	
Cld. Iron Co.....	3	8,450,000	1.19	....	1.19	.....	These rails have been laid 6½ years, and the bars tested are probably the most durable of the lot, worn rails having been removed.
C. R. M. Co.....	4	8,450,000	0.92	.....	0.92	.....	
Valley.....	2	8,450,000	1.77	.....	1.77	.....	
Trenton steel-top.....	1	8,450,000	1.65	.....	1.65	.....	

Note.—In preparing the above table the rails of each brand taken up on tangents were averaged directly as shown in the first column of "comparative wear." In order to utilize those taken up on curves also for purposes of comparison, the observed wear was reduced to an equivalent tangent wear by deducting from each the proper percentage *for the wear due to curvature only* on the given curve, as deduced from the general average shown in Table 1. Thus, it appears from Table 1 that the wear on a 5° 40′ curve averages twice that on a tangent. One-half the *observed* wear on any such curve was therefore taken as the tangent wear; or,

by formula, *equated tangent wear* $= \frac{\text{observed wear on any curve of } d^{\circ}}{1 + .03\,d^{2}}$

Only a few rails of the C. R. M. Co. steel of 1876-8 were treated, as the wear at most points had been too little to make it advisable. Comparatively few of the Dowlais and C. R. M. Co.'s steel of 1874-5 were tested, because there is but little in the track, viz., 17.19 and 11.27 miles, respectively. It will be noted that the C. R. M. Co. steel of 1874-5 appears to be a very superior rail as respects wear, and this is fully supported by comparative statistics of breakage and lamination given in. The later C. R. M. Co. steel does not show so well (at least in the few samples examined) and appears to be a considerably softer rail judging by the freedom with which it flattens at joints and other similar indications.

In addition to the data recorded in Tables 1 and 2, from which the above table was deduced, some comparative examinations were made of some steel rails in the yard of the C., C., C. & I. Ry., for which the tonnage could not be ascertained with much accuracy. The brands examined were:

1. A lot of 30 tons English (John Brown, Sheffield) steel, sent to this country as a sample lot in 1865, and laid the same year.
2. Some C. R. M. Co. steel of 1874, laid opposite the said English steel.

The result may be stated as follows:

Brand.	Weight per yard, lbs.	Time laid.	Estimated tonnage.	Loss of weight, lbs. per yard.	Loss per 10,000,000 tons.
John Brown, Sheffield, 1865.....	60	13½ years.	76,500,000	13.7	1.79
C'l'd R. M. Co., 1874.....	60	4½ "	38,300,000	6.5	1.70

The *absolute* amount of tonnage is, in each of the above cases, quite doubtful. *Relatively*, however, the amounts given must be very nearly correct, which shows that the two brands are very nearly on a par as respects wearing qualities.

TABLE 5.

Showing the Number of Broken Rails on the Atlantic & Great Western Railroad for the past Five Years for each of the Prominent Brands.

Year.	C. R. M. Co. steel. 1876-78. Miles in track.	No. broken.	1874-75. Miles in track.	No. broken.	English steel. Miles in track.	No. broken	Steel-top. Miles in track.	No. broken.	C. R. M. iron. Miles in track.	No. broken	C. I. Co. iron. Miles in track.	No. broken.	English iron. Miles in track.	No. broken	Other iron. Miles in track.	No. broken.	Total iron. Miles in track.	No. broken.
1873-4.....	.....	....	1.09	0	109.43	40	34.87	16	119.40	12	136.27	41	45.02	180	97.88	59	398.57	292
1874-5.....	.....	....	11.27	4	109.31	85	33.48	50	.....	56	.....	313	.....	300	.....	74	.....	743
1875-6.....	.....	....	11.27	0	109.29	6	32.60	1	.....	1	.....	21	.....	113	.....	11	.....	146
1876-7.....	23.12	1	11.17	1	109.27	50	29.35	55	.....	280	.....	352	.....	126	.....	215	.....	973
1877-8.....	75.08	6	11.00	2	108.90	12	26.45	0	164.68	3	61.78	8	20.65	49	75.41	2	322.52	62
1878-9.....	.....	33	.....	16	.....	383	.....	204	.....	362	....	287	... .	117	.....	383	.....	1,149
Totals.....	49.1	40	9.47	22	109.24	585	31.35	326	148.0	714	104.0	1,022	35.0	885	91.16	744	375.16	3,365
Bars removed per mile per year.....	0.27		0.39		0.89		1.73		0.81		1.64		4.20		1.35		1.50	
Average age.....	1¼ years.		4 years.		6½ years.		5 years.		3 years.		6 years.		14 years.		4½ years.		3½ years.	

have lost any measurable height under 12,000,000 tons duty.

Safe Limit of Wear.—Judging by the views and opinions of several of the road-masters of this road, the safe limit of wear for ordinary steel rails appears to be about ⅝ inch in height, or 14.1 lbs. of weight per yard. The committee of the American Society of Civil Engineers before mentioned estimate the safe wear at only ½ inch in height, while the official French publication above mentioned estimates the allowable wear at a still less limit, or only 10 millimeters (0.4 inch) for a 60-lb. rail.

All these estimates, however, appear to be based upon rails which were *not worn out*, but which approached more or less closely to the assumed limit of wear, and the estimates all appear to be too small. No rails could be found on the Atlantic & Great Western Railroad which had lost more than 10 lbs. per yard; but in the Cleveland yard of the Cleveland, Columbus, Cincinnati & Indianapolis Railway some 30 tons of English (John Brown, Sheffield) steel were found, laid in 1865, which have already lost 13.7 lbs. in weight and nearly ⅝ inch in height, and which yet show no sign of failure or lack of safety, but are considered good for several years' more wear. Details of observations on these rails are given in the remarks to Table 5. The speed of trains over them is slow, however, and it is perhaps a sufficient estimate, although certainly not excessive, to take the limit of wear at 14 lbs. per yard on the "open road." On this basis the probable average life of the English steel and C. R. M. Co. steel of recent rolling on the Atlantic & Great Western Railroad will be 140,000,000 tons, and of the C. R. M. Co. rails, of 1874-5, 233,000,000 tons. The French authority before mentioned estimates the ultimate life of steel at 200,000,000 "tonnes," or 220,400,000 tons of 2,000 lbs. The Committee of the Society of Civil Engineers before mentioned estimate the ultimate life on a tangent at 156,250,000 tons for ⅛ inch wear, equal to 195,300,000 tons for ⅝ inch wear. It appears a safe estimate, therefore, to assume the ultimate life of ordinary steel on a tangent at 140,000,000 tons, running up to at least 200,000,000 tons for extra qualities.

Wear of Steel on Curves.—Sufficient data are given in Table 1 to determine this question with a considerable degree of certainty. It is evident from the table that the wear increased considerably more rapidly than the degree of curvature, and it was found that the following empirical formula *fitted the observed facts* as nearly as any which could be devised, viz.:

Extra wear due to curvature in lbs. per yard per 10,000,000 *tons duty on a d° curve* $= 0.03\,d^{2}$.

And hence,

Total *wear of rails on a d° curve in lbs. per yard per* 10,000,000 *tons duty* $= 1 + 0.03\,d^{2}$.

In the last column of Table 1 is given the wear according to this formula on the various curves directly opposite the average observed wear, and the closeness with which the two correspond can be seen.

It is not pretended that this formula is strictly correct even in principle, but several theoretical considerations indicate that it may be nearly so, into which, however, it is hardly necessary to enter.

No evidence could be detected that the depreciation from lamination and breakage is noticeably greater on curves than on tangents, excepting in the case of the C. R. M. Co. steel of 1877 laid on the "Pine Valley" 8° curves, which have been before alluded to.

From the above data as to wear of rails on curves, together with the data as to tangent wear already given, we may construct the following table (Table 6) showing the probable life of fairly good steel under various circumstances.

Comparative Wear of Inside and Outside Rails on Curves.—This appears to be extremely variable on individual rails, sometimes the outside rail and sometimes the inside rail showing the most wear, but the averages show it to be an invariable rule that the outside rail wears the most, even on the easiest curves. The sharper the curve the greater this disproportion, until, at about a 10° curve, it appears that the wear on the inside rail ceases to increase, and all the additional wear from sharper curvature is confined to the outside rail. It seems plain that any increase of elevation cannot correct this, since the wear of the outside rail arises, not from the centrifugal force, but from the flange pressure necessary to make the truck roll in a curve instead of in a straight line, as is its natural tendency to do, *even if the wheels are coned*, so long as the axles are fixed parallel with each other.‡

The manner in which the wear takes place on the inside and outside rails is quite different, however. It is confined to the side and interior edge of the outside rail, but directly on top of the inside rail so that the outside rail is almost always the highest, as is evident in the sections shown in Diagrams B herewith. It is also an invariable rule that the outside rail preserves a smooth and polished surface without projections beyond its original section, whereas the inside rail laminates or "flows" somewhat so as to form, in many cases, a pronounced edge or rim extending beyond the original section and retaining a part at least of its original strength, but giving the rail a ragged and defective appearance. This result is apparently due, not to the *load*, but to the slippage of the wheel on the rail. The same phenomenon takes place within a very few minutes and to a very extraordinary degree if an engine persistently slip its drivers for a short time on a single spot. Diagrams D show one of these cases, and were taken from the indentations made by the four drivers of a single engine on new and perfectly sound rails on a 6° curve and heavy grade. Several of these exist at

‡ This fact the writer has determined by practical experiment. It seems to be generally neglected in discussions of the subject.

TABLE 6.

Showing the Probable Ultimate Life of Steel Rails on Curves and Tangents.

ALIGNMENT.	Rail-wear per 10,000,000 tons. Lbs. per yd.	Ultimate life in tons. For sound rails.	Ultimate life in tons. Deducting 20 per cent. for lamination and breakage.	Ultimate life in years. On 1st, 2d, and Mah. Div's (ann. ton'e 3,000,000)	Ultimate life in years. On 3d and 4th Div's (ann. tonnage 2,000,000)	Ultimate life in trains (assumed to weigh 400 tons each).	Cost per train-mile, est'ting cost of rails less scrap val. at $23.50 p.m.
Tangent.....	1.00	140,000,000	112,000,000	37 years.	56 years.	280,000	0.84c.
2° curve....	1.12	125,000,000	100,000,000	33 "	50 "	250,000	0.94c.
4° "	1.48	94,000,000	75,200,000	25 "	38 "	188,000	1.25c.
6° "	2.08	67,000,000	53,600,000	18 "	27 "	134,000	1.75c.
8° "	2.92	48,000,000	38,400,000	13 "	19 "	96,000	2.45c.
10° "	4.00	35,000,000	28,000,000	9 "	14 "	70,000	3.86c.
12° "	5.32	26,200,000	20,960,000	7 "	10½ "	52,400	4.48c.
14° "	6.88	20,300,000	16,240,000	5½ "	8 "	40,600	5.76c.
16° "	8.68	16,000,000	12,800,000	4 "	6½ "	32,000	7.37c.

NOTE.—It is not assumed that the life of rails on sharp curves will be as great as above estimated *if left on the curve till worn out.* By removing them when about half worn out, however, they will still be good for their ultimate life on a tangent.

The cost of renewing track with iron rails has averaged about 7 cents per train-mile on a large number of roads for the past twelve years, making the steel appear to be about eight or nine times less expensive. This estimate includes *cost of rails only*, without any other expenses for ties, switches, frogs, etc.

On the Atlantic & Great Western Railroad, 24¼ per cent. of the line is curved, averaging a little over a 2° curve. The average cost of steel per train-mile for the whole road would therefore be $0.84 + \frac{1}{4}(0.94 - 0.84) = 0.86$ cent.

various points of the line but none, so far as known, quite so pronounced.

It will be seen in Diagrams D how very much more the inside rails were injured than the outside, the latter indeed being only slightly indented, without "flowing" at all. A part of this difference is undoubtedly due to a difference in the quality of the rails, but, judging by the experience on the Pine Valley curves as already detailed, a large part of it must also be due to the more destructive effect of slippage on the inside rail; the latter being due, in part to the greater *load* on the inside rail (about 10 per cent. in this case, for 3 in. elevation), but mainly to the difference in the position of the inside and outside wheels on the rail.

Comparative Wear of Rails on Grades.—So far as can be ascertained, the rate of grade *in itself* has no appreciable effect on the wear of rails until it becomes so steep as to necessitate the use of sand and brakes to a noticeable extent. At the foot of long grades the wear is somewhat greater, owing to the speed of running, but this is compensated for by less wear at the top of grades, and the difference in any event is so small on a tangent as hardly to constitute an important element. An attempt was made to determine this point, but the difference was found to be so slight as to be frequently overcome by differences in the original weight of rails, and the attempt was abandoned. The exact weight of rails at several such points being now known, however, it will be possible hereafter to determine this point exactly.

The effect of speed on curves seems to be more important. An example may be found in two 5¼° curves shown in Diagrams B, where the wear is some 40 per cent. greater for a difference in speed of 10 to 15 miles per hour.

Comparative Wear of Rails on Bridges.—This was found, contrary to expectation, to be in no way reduced by the more elastic support for the rails. A trial was made in three instances and no difference could be discovered between the wear on bridges and on adjacent embankments.

Comparative Wear on the Ends and Middle of Curves and at Points of Reversed Curvature.—Table 3 shows some observations of rail wear at points of reversed curvature, two of which were still exceedingly sharp, and all of which were (so far as known) originally laid out without connecting tangents. So far as can be observed, the wear is in no way greater at such points than at any other tangents, provided the rail *is* a tangent, but if the curve is so sharp that the rail itself is curved, the wear is slightly increased. The same is true of the wear at the ends of curves. No indication could be discovered that the wear is greater at such points than in the middle of the curve, but in all cases the wear, from point to point, seems to be strictly in accordance with the curvature *at that point*. Two or three rails on a 1° curve will show the wear due to a 1° curve whether the adjacent rails are on a tangent or on a 10° curve. This rule, it may safely be assumed, would not hold if the track were in such poor line and surface as to make abrupt angles in the track, but none such were found.

Contributions.

Operating Expense Accounts.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the general discussion of railroad accounts that has arisen in connection with the contemplated adoption of a uniform style of reports by the commissioners of the various states, very great importance has been given to the manner of keeping and sub-dividing the "Operating Expense" account; and it may be well to consider whether the proposed plan or plans now generally used are the best that can be devised, or whether they show with sufficient accuracy, just what the expenses of each year really are.

If the object in view in requiring such a statement is to collect accurate data in relation to the cost of railroad transportation, so as to enable the state supervision of railroads to be just and intelligent, it is undoubtedly a commendable one; but, to say the least, it is questionable if any statement based on the present manner of keeping expense accounts, can be made of much advantage in attaining results not only desirable to the public, but which, on the principle that the interests of the public and of the railroad corporations are identical, could be of any assistance in solving this important problem.

What the public demand, and, if they are entitled to any information, what they should receive is good solid facts, that can be relied on, even if they be few in number, rather than elaborate statements that give many items in minute details, and from which they are unable to form correct, and liable to form incorrect, ideas upon a subject of such great interest.

The question of railroad transportation is an intricate one, and, on the various points connected therewith, many diverse opinions are held by men of experience, and who have made everything appertaining to railroads their special study.

The manner of keeping railroad accounts is no exception to this general rule, and almost every accountant has some particular point concerning which he differs from other accountants, and while the writer has no intention to set himself up as an authority, still, he feels inclined to maintain that the proposed form of report does not meet the necessities of the case, and that no other form that may be devised will do so, unless some provision be made for distributing the cost of meeting the general depreciation of the property among the different years to which it justly belongs.

On the best managed roads considerable variation in the cost of maintaining road and equipment must occur that is not entirely dependent on the decrease or increase of the business of the respective years.

It may be necessary to lay a large quantity of new iron, or to rebuild several bridges or buildings, or other expenditures may be necessary that will require a large amount of money, and which has been caused by the traffic of several years. All this great expenditure certainly does not legitimately belong to the expenses of the year in which the outlay was made, though according to the usual manner of keeping expense accounts, the entire amount would be charged against the income of that year.

Take almost any road and make a comparative statement of its expenses for a period of five consecutive years, and a marked difference will be found in the expenditure for repairs to road and equipment during the respective years, when there will be no corresponding difference in the revenue or tonnage of the same years.

The following abstract of the operations of one road for the term of four years was taken from the public reports, and will serve as an illustration of the facts on which the above assertions are based:

Comparative Statement showing Earnings, Expenses and Traffic of the N., O. & P. R. R. for the four years ending Sept. 30, 1877.

	1874.	1875.	1876.	1877.
Gross earnings.....	$703,000	$750,000	$670,000	$560,000
Operating expenses:				
Maintenance of road.....	$255,000	$350,000	$232,000	$158,000
Maintenance of equipment.	65,000	47,000	108,000	77,000
Transportation expenses.....	155,000	160,000	175,000	181,000
Total expenses.	$475,000	$557,000	$515,000	416,000
Passengers one mile..	4,440,000	4,565,000	4,575,000	4,481,000
Tons one mile	40,000,000	47,000,000	39,000,000	37,000,000

With the exception of making the amounts even for convenience, this statement agrees with the data furnished to the state, and is probably correct; but the question naturally arises what information can the public, or, in fact, any one else derive from it, on which they could base any calculation in regard to the actual cost of transportation per ton or passenger mile on that road during any given year? Or would the division of the expenses, as advocated by Mr. Towne, give any more authentic information in relation to the cost of transportation?

In whatever manner the "operating expense" account may be sub-divided, so long as the entire amount of expenditure is charged against the year in which used, the result cannot help being misleading. The face of above statement shows that while the traffic on that road in 1876 was about 20 per cent. less than in 1875, the cost of maintaining equipment was nearly 130 per cent. more; and again, in 1877, while the amount of traffic decreased less than 10 per cent., the expenditure for repairing equipment decreased nearly 30 per cent., and the road expenses showed a still greater decrease.

In other words, on the hypothesis that the expenditure of each year is a proper charge against the business of that year, it was 130 per cent. harder on the engines and cars of this company to haul 39,000,000 tons one mile in 1876 than to haul 47,000,000 tons one mile in 1875. The passenger business being about the same each year, it is hardly necessary to take that into consideration.

Again, on the same hypothesis, the wear and tear on roadbed, superstructure, iron, etc., in 1877 was over 30 per cent. less in hauling 37,000,000 tons one mile than in hauling 39,000,000 tons in 1876.

It is altogether probable that in this particular case there were good reasons why the expenses vary so much in the different years. But there is nothing in the reports to show what those reasons were, and the natural conclusion that would be arrived at by any person whose only information in relation to it was that found in the reports would be that it was an actual difference in the cost of transportation.

For another instance where the present or proposed form of reports would be decidedly misleading, we will take the following illustration:

We will assume that the X., Y. & Z. R. R. is an important road, with large traffic, and in first-class condition in every particular, when a change of management is made, and a system of rigid, or rather injudicious economy, is inaugurated. Nothing is done toward maintaining the road or equipment up to a proper standard; the service of working trains is reduced to the least amount practicable; ties are left in the track long after they become unfit for anything but fuel; no renewals of rails are made, excepting to exchange the worn-out iron in the main track for the comparatively good iron that may possibly be found in unimportant sidings; the trackmen are limited to the smallest number circumstances will permit; all general repairs of bridges, buildings, fences and gates are postponed to some indefinite time in the future; engines and cars only receive sufficient outlay to keep them running in some kind of shape; in fact, nothing is done that can be avoided or postponed, all kinds of make-shifts are used, and permanent improvement and maintenance is made secondary to immediate results.

For a greater or less period, depending on the condition of road when this policy was adopted, this road will show a very low rate of cost of transportation, and it is not altogether unlikely that in the annual report to the stockholders comparative statements will be inserted to show how under the new management the cost of operation has been reduced, and statistics will be presented for their consideration showing amount and variety of traffic, average haul, tons one mile, etc., and probably the President will give them a lengthy dissertation on how much cheaper freight can be hauled in 1879 than in 1876.

But there will come a day of reckoning when the falsity of this policy of economy will be completely demonstrated, and with such emphasis that there will be no mistaking the fact that almost every dollar saved, or supposed to have been saved in the past, has really resulted in causing an outlay of a far greater amount.

Owing to the road-bed not receiving the proper repairs when they were needed, the wear on iron and rolling stock has been much greater than it should have been from the amount of business carried on or with them; through lack or necessary care the bridges and buildings have deteriorated rapidly, and where if taken in time only a moderate amount of repairs would have been required, now a thorough rebuilding or a new structure is needed.

However, this illustration was not made to demonstrate the poor policy in practicing extreme or unthinking economy, but to present a point that no form of report yet recommended seems to have met.

It may be said that this is an imaginary case without a parallel in the annals of railroading, or that no experienced railroad President or Superintendent would conduct the management of his road on any such system.

Well, may be not, if he could prevent it. But we will avoid controversy on that point, by attributing the cause of the adoption of such a policy to other reasons; we will assume that while the railroad corporation may be well aware that, in the long run, this is the most expensive and extravagant manner to operate a road, through lack of means at their command, they are forced to curtail expenses at every point, regardless of ultimate results, and have to make every makeshift imaginable to keep their road in operation. Is it not safe to assume that there are many roads in this position, and that could very easily expend treble the money on their road that they do, and not waste a dollar, if they could only obtain the money; and who, through inability to procure the wherewith, are forced to earn the money before expending it, even if they are fully convinced of its being poor policy to delay necessary repairs?

Now, in the instance just cited, under the principle that everything is to be charged to the operating expenses of the month or year when used, a large amount would often be included in the expenses of one year, when by far the greater part is really a proper debit against the business of preceding years.

Suppose that just about the time that the X., Y. & Z. R. R. found that they could no longer delay making thorough and extensive repairs in every branch of their property, an alliance should be formed with some other road that would largely increase their traffic. At the end of the year when the reports are made public and railroad experts begin to analyze them, John Henry Jenkins, Esq., a self-constituted authority on transportation affairs, takes the report of the X., Y. & Z. R. R. in hand, and by comparison of tonnage and expenses with preceding years clearly proves to his own satisfaction, and probably convinces many others, that the cost of doing the increased business given the X., Y. & Z. R. R. through their arrangement with the R., S. & T. R. R. far exceeds the increased revenue derived therefrom.

Why should he not do this, when, according to the reports, "he himself has said it," even, if as a matter of fact, the arrangement referred to had been highly advantageous to the X., Y. & Z. R. R., and that a large amount of the expenses included in that year's report was made to cover depreciation caused by the poverty-stricken policy of former years?

It would really seem that the only practicable method to arrive at the proper proportion of expenses to be charged up yearly would be the one that would make the most equitable provision for determining the just amount to be charged up yearly to meet the natural and ordinary depreciation in the condition of the property. As a means of accomplishing this result, I would suggest that a "Renewal Fund" account be required, something on the plan mentioned in the *Gazette* of May 16.

This account could be charged with all expenditure for repairs when made, and the amount to be charged "Operating Expenses" and credited to "Renewal Fund," monthly or annually, as might be preferable, could be based on the following:

1. The average depreciation caused by action of the weather, by natural decay, or by any other cause not dependent on the movement of traffic.

2. The average wear and depreciation caused by the movement of trains. Under the first division would probably come a very large percentage of the repairs of road-bed, renewal of ties and repairs of buildings, bridges and trestles, fences and telegraph line, as to a very large extent these are independent of the amount of business done, being mainly the result of exposure to the weather or natural decay.

To estimate very closely what these percentages are cannot be impossible to those who are thoroughly conversant with maintenance of way, and it could be charged up in equal amounts, either monthly or annually.

The expenses that depend on the amount of traffic that should be included in "Renewal Fund" account are the portion of cost of repairs of road-bed, renewal of ties, repairs of buildings, bridges, etc., not embraced in the first class; also, the renewal of iron, repairs of engines, cars, and machinery and tools, and, possibly, several other items.

Taking into consideration the average life and wear of iron, and the amount of service that can reasonably be expected from engines and cars, and then by taking a certain amount of work as a unit it can easily be determined what amount to charge against the "Operating Expense" account annually to meet the cost of this class of repairs.

To say what are the right percentages for these two classes of expenditure is beyond the province of accountants, and can only be computed by men of experience and of thorough technical knowledge of the various departments of the service, but it is none the less necessary that something of this kind should be devised before we can say with any degree of accuracy what the real cost of transportation is on any road in any given year.

This plan for keeping a "Renewal Fund" account may be very crude and not by any means the best one that can be devised; and it may have many serious disadvantages of which the writer may be ignorant. But the main object in writing this article is not to advance any pet theory, but to endeavor to show the necessity of a radical departure from the routine forms that have been heretofore used in keeping expense accounts, and to try to awaken an interest in the matter that might result in finding something to supersede the present system of accounts that would make the reports of railroad corporations of more value to those for whom they are intended. *****

The Passes Sold at Chicago.

LYNDONVILLE, Vt., June 2, 1879.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue May 30, under head of "Speculators in Passes," you give with others my name as having sold passes to scalpers. As this does me some injustice I trust you will publish the following facts: I applied for and received passes for myself and one, the "one" being a near relative. Not being able to make the trip myself, as intended, the other party proceeded alone. I am entirely at a loss to account for the manner in which the passes left his hands. If sold, which I doubt, the fact remains that I was not in any way a party to the sale. W. P. LOVERING, JR.,

General Ticket Agent Passumpsic R. R., Montreal & Boston Air Line, Southeastern R. R.

[The impression we gathered from the article referred to (copied from the Chicago *Inter-Ocean*) was that the passes which the Chicago scalper sold were partly stolen or forged passes, and that it was not supposed that they were all sold by the parties to whom they were issued.—EDITOR RAILROAD GAZETTE.]

Uniform Accounts—Will the State Pay?

TO THE EDITOR OF THE RAILROAD GAZETTE:

There is one phase of the subject of uniform returns that seems not to have received the consideration it merits from the commissioners or the railway experts who have ideas of a statistical nature, namely, the expense that will attend the introduction of a uniform system.

If the railway companies are to be compelled to formulate a new division of operating expenses and provide other statistical information for the benefit of amateurs and the delectation of the curiously inclined, provision should assuredly be made by the state authorities to reimburse the railway companies.*

If the state in its superior wisdom wishes information that the accounts of the railway companies do not now show, then the state should clearly foot the bill. If the information provided for and exacted by the *owners* of railway property (*the men who have got their money in it*) is not sufficient for our state officials, then the state should pay for all extra expense or trouble it incurs. Clearly the railway companies ought not to be burdened with the expense of educating the officials of the state nor of providing bulk for state reports.

Give us the results, Messrs. Commissioners, and leave the details to the clerks and men of inquisitive turn of mind.

NON-PARTISAN.

* Railway men should keep this fact in mind for reference and petition to the various legislatures and to Congress at the proper time. Let no item of cost be overlooked or ignored. After the dance comes the fiddler's bill. These petitions will prove very instructive to the people.

Locomotive Expenses on the Grand Trunk and the Great Western.

In answer to some criticisms made on the locomotive expenses of the road, Sir Henry W. Tyler, President of the Grand Trunk, has prepared a long paper on the cost of fuel and repairs of rolling stock on the Grand Trunk, the Great Western and other railways, the concluding summary of which is as follows:

"In fairly comparing the fuel expenditure of the Grand Trunk with that of the Great Western Railway Company, the geographical position of the two railways, and many other circumstances, must, then, be taken into account. Even west of Toronto, the conditions of the two lines are very different, as regards climate, length and gradients, though they are in some respects similarly situated; the Grand Trunk extending from Toronto and the International Bridge on the one side to Detroit and Goderich on the other, while the Great Western extends from Toronto and the Suspension and Buffalo bridges on the east, and to Sarnia and Windsor on the west. Within the above area, the Grand Trunk and Great Western companies, as far as regards first cost, buy their fuel at nearly the same price. Last year at Suspension Bridge and Black Rock (Buffalo Bridge), the Great Western paid $3 and $3.10 per net ton, and the Grand Trunk at Black Rock (Buffalo) $3 and $3.05 per net ton. At Detroit, the price paid by both companies was exactly the same—$2.85.

"But while Toronto is the most easterly point of the Great Western system, the central and most important district of the Grand Trunk lies between Toronto and Montreal, a distance of 333 miles; and from Toronto, the most easterly point of the Great Western, to Portland, the most southeasterly point of the Grand Trunk, the distance is 630 miles; and to Riviere-du-Loup, the most northeasterly point, the distance is 616 miles. It is upon this portion of the Grand Trunk road, east of the Great Western, that about five-sixths of the whole consumption of fuel takes place.

"The nearest points of production for coal over the whole of this distance are, on the western side, the coal fields from which the Great Western is supplied; and on the eastern side, the coal fields of Nova Scotia, distant more than 1,000 miles by sea, or such supplies as can be obtained from England in competition with Nova Scotia coal.

"Last year coal at Portland cost $4 per ton alongside the wharf, and at Montreal, $3.75 per ton, delivered on the wharf, and the supply required for the section from Montreal westward for a considerable distance was necessarily obtained at that port. The wood fuel on the eastern section of the Grand Trunk, where it is principally used, is unfortunately soft wood, and its relative value is much less than the wood purchased on the section west of Toronto. As an illustration, I may say that on the Central District, when wood was used, a cord produced 461 car-miles, while the same quantity on the eastern section only produced 344 car miles, the difference arising mainly from the inferior steam-producing properties of the wood.

"The chief causes of the differences between the cost of fuel on the Grand Trunk and Great Western may be summarized as follows:

(1.) The greater first cost of fuel.
(2.) The additional cost of hauling long distances, and of handling at different points.
(3.) The quality of the wood.
(4.) The effect of the climate on consumption on different parts of the line.
(5.) The loss from stacking coal, necessarily obtained in the open season, and for long periods in advance.
(6.) The gradients on some portions of the line.
(7.) The extra shunting necessary on a single line of so great a length, and the proportion of double and single line working.

"In Mr. Trevithick's report of July, 1868, he stated: 'That he was unable to discover any evidence, or even fair inference, that it (the issue price) involves an undue expenditure on the part of the Grand Trunk Company, or that, if it were possible to establish a thoroughly legitimate comparison, it would tell against the Grand Trunk,' and my own inquiries have led me to the same results. At the same time he pointed out then, what is the case now, that the different modes of dealing with the cost of haulage, and with the apportionment to departments of the cost of handling, did result in some differences in the issue price of fuel—that is to say, as regards one company, the cost of fuel was apparently increased by these charges, while, as regards the other company, the same charges appeared under different items of expenditure.

"Instead of the results of the working of the last 3½ years on the Grand Trunk comparing disadvantageously with the Great Western, a fair comparison of the results leads to an entirely opposite conclusion. The Grand Trunk has had to work under the disadvantages of higher cost of fuel, greater distance from sources of supply, necessity for stacking, worse gradients, longer single line and far worse climate; and yet the whole expenditure for working the line has, during the period referred to, been at a lower percentage of the gross receipts than on the Great Western; although in previous years, owing to the more favorable position and circumstances of the Great Western Company, the percentages of expenditure have been greater on the Grand Trunk.

"I attach four statements A, B, C and D. (A) being a statement of gross receipts and working expenses, etc., of the Grand Trunk Company, for seven half years commencing with June, 1875, and ending with June, 1878; (B) being a similar statement for the Great Western main line, and (C) for the Great Western main line and branches for the same period; and (D) being a comparative statement of the total working expenses and actual car mileage on the Grand Trunk and Great Western systems with branches, respectively, for the same seven half-years.

"Epitomizing the figures, the following is the result:

WORKING EXPENSES.

	Percentage of gross receipts.	Per train mile.	Per traffic engine-mile.	Per car-mile.
		d.	d.	d.
Grand Trunk	77.85	41.11	31.62	2.49
Great Western main line	79.88	46.86	37.40	2.98
Great Western main line and branches	81 37	46.70	37.67	3.22
Excess on Great Western main line	2.03	5.75	5.78	0.49
Excess on Great Western main line and branches	3.52	4.59	6.05	0.73

"It will thus be seen that under each of the above heads the Grand Trunk has been worked at a considerably lower rate, both in comparison with the receipts and with the work done, than the Great Western.

"To put the matter simply, had the working expenses of the Grand Trunk for the seven half-years to June, 1878, been as high in proportion to the gross receipts as the working expenses (1) of the Great Western main line, or (2) of the Great Western main line and branches—then in the former case a sum of £130,000, and in the latter case of £230,000, would have been added to the Grand Trunk working expenses.

"The relative position which the two companies occupied in the year ended June, 1873 and 1878, are illustrated in the following figures:

"In 1873* the expenditure of the Great Western was at the rate of 65.30 per cent. of their receipts.

"In 1878 on the main line and branches it was at the rate of 73.33 per cent. of their receipts.

"The Grand Trunk Company's expenditure in 1873 was at the rate of 82.72 per cent of their receipts.

"For the year which ended on the 30th June last it was at the rate of 75.35 per cent.

"There was therefore an actual increase in the ratio of the expenditure of the Great Western Company, while in that of the Grand Trunk Company a decrease was effected in the face of a reduction in the receipts per ton per mile for freight of over 45 per cent.

"These figures certainly do not justify the language used by those who in criticising our expenditure speak of 'waste and extravagance being allowed to run riot,' and 'plunder,' etc. But they point to the conclusion that to some extent our higher expenditure in fuel in comparison with the Great Western arises from a divergence in the methods of charging it in the accounts. If not, then in other respects the Great Western Company's expenditure must be extravagant, which I do not for a moment believe. On the contrary, I give their officers, as well as our own, full credit for honest and economical administration.

"It will be observed then, that when all the conditions are fairly weighed and considered, and when the only true test—of work performed—is applied, the comparison—made in the fairest manner that the circumstances allow—is satisfactory as regards the Grand Trunk Company. We must always, as will have been observed, be at a disadvantage, in comparison with the Great Western Company, as to the rate at which we are able to charge out fuel for consumption on by far the greater portion of the Grand Trunk railway. But this disadvantage has, in fact, been hitherto neutralized by careful management, and other conditions, inasmuch as our percentage of working expenses is less than that of the Great Western Company, and the working per car mile is less on the Grand Trunk than on the Great Western Railway. But we must not remain satisfied with that advantage. The most important question with which, after all, we are concerned is, not whether we have been better or worse than others in the past, but how much we can ourselves work more economically and more efficiently in the future. Fuel is the most telling article of our expenditure. It counts even now for 17¼ per cent. in the total of our working expenses. Wood will become still more expensive and more difficult to obtain of good quality, and less effective for producing steam on portions of our line. We must proceed with the conversion of our engines, and, if the price is not raised by exceptional or artificial causes, employ a larger proportion of coal. We must construct more fuel sheds, and improve the connections at Montreal, and the means of handling at that and other points of coal supply and coaling stations. We must endeavor to further improve our rolling stock, and to reduce our passenger train and car mileage in proportion to the number of passengers carried. We must, in time, leave no stone unturned further to reduce the cost at which fuel can be charged out for consumption, and to increase the proportion of work which can be obtained from its employment."

* NOTE.—The expenditure on the Great Western Company's "branches" is not given in full in the accounts of that company in 1873.

The Western Connection.

A Sunday-school teacher in this city has a boy in her class who has not failed in his penny contribution for more than a year, and when he was found empty-handed last Sabbath the teacher observed: "Why, Johnny, did you forget your penny to-day?" "No, ma'am," he humbly replied, "but father says the Wabash road will do this town more good than any fourteen Sunday-schools, and I'm going to chuck my coppers into that enterprise for the next few weeks." "Won't the heathen miss your pennies?" she inquired. "I suppose they will, but we've all got to come right down or this town is busted."—*Detroit Free Press.*

Which shows that the good people of Detroit have not at all abated their patriotic interest in the Western connection.

The Shortest Road.

A paragraph is going the rounds stating that the shortest organized railroad in the world is the Wood River road in Rhode Island, seven miles long. This is not true. The shortest railroad owned by an organized company that we can recall is the Horn Pond Branch in Massachusetts, two-thirds of a mile long. That, however, is worked by another company, but of independent roads there are the Moshassuck Valley, in Rhode Island, less than two miles long; the Ferro Monte road in New Jersey, 2½ miles; the Mt. Hope road 4¼ miles, the Charlotteburg & Green Lake, 4½ miles, both also in New Jersey, and there are several others of four or five miles scattered through the country. The Wood River road is not the shortest railroad in the world by any means.

"Raising" a Pass.

The man who always gets a pass when he asks for one is likely in course of time to think he owns the railroads and regards the signatures of superintendents and the like as needless formalities. This delusion seems to have possessed the person who signs himself "Eli Perkins," and is pretty widely known under that name as a newspaper writer and a lecturer. Out at Omaha he got a pass to Columbus and return over the Union Pacific for himself; when he came back he had the same pass, but it read "Mr. Melville Landon *and one*," instead of "Mr. Melville Landon," simply, and a lady traveled with him. Moreover, "or Council Bluffs" had been writen in after the word "Omaha." The conductor on the train returning to Omaha suspected something wrong, charged Mr. Landon with forging the additions, and finally collected two fares from him; and now the Omaha papers are recklessly using the words "Eli Perkins" and "forger" as if they were interchangeable terms, and the *Republican* of that city so far forgets the inalienable right of every man who writes for the newspapers to travel free with his sisters and his cousins and his aunts that it permits itself to say, "The whole transaction showed him to be an unprincipled dead-beat and a scab upon respectable journalism." Certainly it was not pretty; but if the railroads will stop issuing passes they will put an end to these little tricks. Bleeding and bandaging and dieting may help this sore, but amputation will cure it, and save us the sight of some very dirty things.

RAILROAD GAZETTE

Published Every Friday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

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EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

HOW MUCH WILL A LOCOMOTIVE PULL?

There is probably no question which a railroad engineer is obliged to answer oftener than this, and, although the calculation required to give a reply is not a difficult one, yet to most of those who are not engineers it seems very abstruse. It has seemed therefore that an article on this subject for persons who, as regards the profession of engineering, are laymen or juniors, might not be without interest or value. To members of that profession notice is given that the article will probably not contain any information which will be new to them, or that is not found in the text-books and treatises on locomotives.

It may be stated, generally, that the means by which a locomotive exerts its power in drawing trains is simply the friction or adhesion of the driving wheels on the rails. Or, to quote from Pambour's old "Treatise on Locomotive Engines:" "Two conditions are necessary in order that an engine may draw a given load: First, that the dimensions and proportions of the engine and its boiler enable it to produce on the piston, by means of the steam, the necessary pressure, which constitutes what is properly termed the power of the engine; and second, that the weight of the engine be such as to give a sufficient adhesion to the wheel on the rail. These two conditions of power and weight must be in concordance with each other; for, if there is a great power of steam and little adhesion, the latter will limit the effect of the engine, and there will be steam lost; if, on the other hand, there is too much weight for the steam, that weight will be a useless burthen, the limit of the load being in that case marked by the steam."

In the early days of locomotives it was thought that the friction or adhesion of the driving-wheels on the rails would not be sufficient to enable such machines to exert their full power; and many contrivances of toothed wheels and mechanical legs of various kinds were devised and experimented with. Even when Wood's "Treatise on Railroads"* was written, the author spoke of "the adhesion, exclusive of the power requisite to drive the engine itself, in the best or modern engines, as equal to the *one-fifteenth* part of the insistent weight; and of the common engines, working with vertical cylinders, as equal to the *twentieth* part of the weight, pressing on the rails by the driving-wheels." Pambour (page 252) gives the maximum adhesion at one-sixth of the weight, but says "the force of adhesion is always at least *one-twentieth* of the adhering weight." In Rankine's "Treatise on the Steam-Engine" (page 529), he gives the adhesion at from *one-twentieth* to *one-fifth*, and adds that "*one-tenth* may be considered an average ordinary value." Perhaps the figures which are most used in practice are those published in Molesworth's "Pocket-Book of Engineering Formulæ," page 124. These are as follows:

ADHESION PER TON OF 2,240 LBS. ON THE DRIVING-WHEELS.

When the rails are very dry	600 lbs. per ton
When the rails are very wet	550 " " "
In ordinary English weather	450 " " "
In misty weather, if the rails are greasy	300 " " "
In frosty or snowy weather	200 " " "

In D. K. Clark's "Manual for Mechanical Engineers," page 724, he gives a report of experiments made by M. Poirée on the Paris & Lyons Railroad with a wagon by skidding the wheels. Of these experiments Clark says:

"At speeds under 20 miles per hour it appears from the table that, when the rails are dry, the co-efficient of friction, or the adhesion, is *one-fifth* of the weight, and that on very dry rails it is one-fourth. As the speed is increased, the adhesion is reduced. These data are corroborative of the results of the author's experiments on the ultimate tractive force of locomotives on dry rails, from which he obtained a co-efficient of friction equal to *one-fifth* of the weight, at speeds of about 10 miles per hour."

It will thus be seen that the co-efficient of adhesion, as given by these authorities, varies all the way from *one-twentieth* to *over one-third*. It is no wonder then that a young engineer in taking up this subject should be a little perplexed to know what data to take in making his calculations. Even if he leaves out the maximum and minimum and takes what these authorities regard as "an average ordinary value," he will be still very much perplexed. Thus Wood gives $\frac{1}{15}$, Rankine $\frac{1}{10}$, Molesworth and Clark $\frac{1}{6}$. In fact, the differences are so great that we are led to believe that some or all of these writers must have been quite mistaken in their facts or their theories on the subject. Recent experiments have made it plain that such was the case. In reading what these writers have written on this subject, it is nowhere apparent that they made any distinction between sliding and rolling friction, or static and dynamic adhesion. Now every locomotive runner knows that after an engine begins to slip its wheels it will not exert as much power as it will before they begin to slip. In other words, the adhesion of the wheels is much less when they slip than when they roll without slipping. Now most of the experiments which have been made to determine the adhesion of driving wheels have given *the sliding friction* of the wheels on the rails and not their *adhesion* when they roll and do not slip. The first is dynamic and the last static friction.

Fortunately the experiments of Mr. Westinghouse and Captain Galton have thrown a great deal of light on this subject, and they have shown in the most conclusive way not only the great difference between these two kinds of friction, but also that the one, at least, is very much affected by the speed and also by the time. That is, they have shown that at a high speed the friction is much less than at a low one, and that it is considerably less after some seconds than it was at the beginning. This confirms the ordinary every-day experience of locomotive runners. The fact that until recently the distinction between these two kinds of friction has not been recognized is doubtless the reason for the great discrepancies in the data relating to this subject.

In the paper "On the Effect of Brakes upon Railway Trains" read by Captain Galton before the Institution of Mechanical Engineers,† the following determinations of the adhesion of wheels is given. It must be kept in mind, too, that he makes the distinction between "adhesive" and sliding-friction. By "adhesive" is meant the friction between rolling wheels and the track:

"On dry rails it was found that the co-efficient of adhesion of the wheels was generally over 0.20. In some cases it rose to 0.25 or even higher. On wet or greasy rails, without sand, it fell as low as 0.15 in an experiment, but averaged about 0.18. With the use of sand on wet rails it was above 0.20 at all times; and when the sand was applied at the moment of starting, so that the wind of the rotating wheels did not blow it away, it rose up to 0.35, and even above 0.40."

This is probably the most correct determination of the adhesion of wheels that has ever been made, and shows that the ordinary rule of taking the adhesion at *one-fifth* of the weight in the driving-wheels is quite within the limits of ordinary practice. Even on a wet or greasy rail, with the use of sand, it was above 0.20 at all times. In fact, if we want to calculate the maximum power which a locomotive will exert if the rails are sanded, we might take the adhesion at *one-third*, and would be quite safe at *one-fourth*.

In order to put these figures in a form in which they can easily be remembered and conveniently used, they may be given as follows:

ADHESION OF LOCOMOTIVES.

Under ordinary conditions without using sand on the rails, or on wet, sanded rails	One-fifth the weight on the driving-wheels.
Under favorable conditions, without sand	One-fourth the weight on the driving-wheels.
On a dry, sanded rail	One-third the weight on the driving-wheels.

These may be taken as working data, but before we can apply them and answer the question which forms the title of this article it must be known how much power is required to draw a given load over a road with known grades and curves. If the authorities be consulted with reference to this point a wider difference even than that relating to the adhesion of driving-wheels will be found to exist. Without comparing these, it may be stated that the most recent experiments have shown that the resistance of good American cars does not exceed 6 lbs. per ton of 2,000 lbs. at very slow speeds on a straight and level track, and when in the best condition and good weather it is probably not over 4 lbs. The wind, however, has an important influence, and as this is very variable it is hardly safe to take the resistance under the conditions named above at less than 6 lbs. per ton.

With reference to the influence of speed on the resistance, it must be admitted that our knowledge is very inexact, and probably the law or laws which govern it are not understood. The following rule, though, will give results which do not differ materially from those given by the most reliable experiments which have thus far been made.

To get the resistance per ton (of 2,000 lbs.) of a train on a straight and level track at any given speed: *Square the speed in miles per hour and divide by* 170 *and add* 6.

To get the resistance per ton due to any grade: *Multiply the rise in feet per mile by* 0.3815 *and add the quotient to the resistance due to the speed on a straight and level track.*

Our knowledge of the resistance due to curves, like that due to speed, is in a very unsatisfactory condition, but the most reliable information we have indicates that the resistance is equal to about half a pound per ton per degree of curvature.

We may then tabulate these calculations as follows:

RESISTANCE OF TRAINS.

On straight and level track at very low speeds	6 lbs. per ton of 2,000 lbs.
For resistance due to speed: *Square the velocity in miles per hour and divide by* 172	.. lbs. " "
For resistance due to grade: *Multiply the rise in feet per mile by* 0.3815	.. lbs. " "
For resistance due to curves: *Add ½ lb. per degree of curvature*	.. lbs. " "
Total	.. lbs. " "

If the radius of the curve is given, the "degree" may be found approximately *by dividing the radius into* 5,730. This rule is correct enough for ordinary curves of over 500 feet radius.

Having these data, suppose we want to calculate how much, say, a Consolidation engine will pull up a grade of 70 feet per mile, with 9° curves and at a speed of 20 miles per hour. The first question to determine will be whether we want to know the maximum load which such an engine will draw, or what it will do in good weather, or what it will do at all times. In the first case we would take the adhesion at $\frac{1}{3}$ the weight on the driving-wheels; in the second at $\frac{1}{4}$, and in the last case at $\frac{1}{5}$. We will assume that the second represents our hypothetical case, and that the locomotive has a weight of 11,000 lbs. on each driving-wheel, or a total of 88,000 lbs. The adhesion would therefore be one fourth of 88,000 lbs. = 22,000 lbs. The train resistance per ton would be as follows:

Resistance on straight and level track =		6.0 lbs.
" due to speed =	$\frac{20 \times 20}{172}$ =	2.3 "
" " " grade = 70×0.3815 =		26.7 "
" " " curve = $9 \times \frac{1}{2}$ =		4.5 "
Total		39.5 "

Therefore, as each ton will have a resistance of 39.5 lbs., and as our engine is capable of exerting a tractive force of 22,000 lbs., the total load which it can pull would be represented by

$$\frac{22{,}000}{39.5} = 556.8 \text{ tons.}$$

As the engine and tender weigh about 72 tons, the train which our engine will pull will be represented by 556.8 — 72=484.8 tons, which is equal to about 24 loaded cars. Of course, to do this work the cylinders must

* Third edition, 1838, page 477.
† See *Engineering* of May 2, 1879, page 371.

be large enough to turn the wheels, and the boiler have the requisite capacity to supply steam.

For the calculation of the size of the cylinders, there is only room here to give a simple rule, which is only approximately correct, but near enough for ordinary purposes. This is: *Multiply the total weight on the driving-wheels in tons (of 2,000 lbs.) by their diameter in inches; then four times the product will be the cubical capacity of one cylinder;* or rather of the space swept through by the piston during a half revolution of the wheels. Having the cubical contents of the cylinder the diameter can readily be found from the stroke or the stroke from the diameter.

AMERICAN RAIL CONSUMPTION.

For two or three years past we have endeavored to show what has been the average consumption of rails for maintenance in the United States in successive years, and, though we could not pretend to have ascertained exactly the percentage of rails renewed each year, yet we succeeded in demonstrating pretty clearly that there had been a remarkable and a constant decrease in that percentage since 1872. The data then at hand were not sufficient for exactness. While the total mileage of road was known, the mileage of *track* was not, and the length of second track and sidings had to be estimated. We could ascertain quite closely the tons used for new construction each year (though here, too, information as to the extent of second tracks and sidings each year was, and still is, lacking); and subtracting this from the total supply (production and importation) gave the quantity of rails consumed for maintenance.

We are helped in this matter by the tables in the last issue of Poor's Manual, which for the first time give the aggregate mileage of track, which at the close of 1877 amounted to 96,632 miles. We are not far wrong in estimating 100 short tons per mile for standard-gauge tracks (rails weighing 56 lbs. per yard make 98½ tons per mile), and 62½ tons per mile of narrow-gauge track (equivalent to 36-lb. rails). On this basis the weight of rails laid in the railroads of the United States at the beginning of 1878 was almost exactly 9,500,000 tons of 2,000 lbs. Beginning with this, and estimating that the new road (including sidings, etc.) constructed of late years has required 103 tons per mile of standard-gauge and 64 tons per mile of narrow-gauge road, we can work back and ascertain the tonnage used in construction, and the tonnage used in maintenance each year and the aggregate tonnage in tracks at the beginning of each year. The reports of the American Iron and Steel Association show the yearly consumption of rails. Thus, beginning with 1872, the tonnages have been:

Year.	Tons of rails consumed— Total.	In construction.	In maintenance.	Aggregate in tracks Jan. 1.
1872	1,530,850	740,500	790,350	7,587,500
1873	1,148,849	392,000	756,849	8,328,0 0
1874	837,695	192,000	645,695	8,720,000
1875	810,770	151,000	659,770	8,912,000
1876	879,916	231,000	648,916	9,063,000
1877	764,744	206,000	558,744	9,294,000
1878	882,695	360,000	522,700	9,500,000
1879	.....	.....	.....	9,860,000

Having here the tonnage in tracks at the beginning of each year and the tonnage used for maintenance each year, by dividing the latter by the former we ascertain the *percentage* of track renewed each year, which is as follows:

1872	10.40 per cent.	1876	7.16 per cent.
1873	9.08 "	1877	6.01 "
1874	7.40 "	1878	5.50 "
1875	7.40 "		

These percentages are considerably smaller than we have reported hitherto, when we underestimated the mileage of second tracks and sidings, which the last issue of Poor's Manual gives us. We were also, we think, misled by the reporting of production in short tons, instead of the long tons in which rails are usually bought and sold. But we have always cautioned our readers against accepting the figures for percentages of renewals as indicating anything more than the variations from year to year, which is done perfectly, however erroneous the estimate of tons per mile may be, if it is the same for all the years.

The striking result shown then and shown now is the continued decrease in the average proportion renewed—little more than half as great in 1878 as in 1872.

The effect of this on working expenses is something tremendous. With the average consumption of 1872 the quantity of rails required for maintenance in 1878 would have been 988,200 tons instead of 522,700, and the cost of the additional 465,500 tons in the track would have been about $19,000,000—say $240 per mile of road.

It will doubtless surprise many to find that the average life of rails, even in the earlier years named, has been so long. The figures indicate a life varying from 9.6 years in 1872 to 18 years in 1878. When steel was first introduced we heard a good deal of complaint that the roads could not get iron that would last three years under their main-line traffic. But, as was natural, there was a good deal of complaint from the roads which were carrying a very heavy traffic with heavy locomotives, though these formed but a small proportion of the total mileage. Now, though the tracks with the heaviest traffic have been very generally renewed with steel, at the beginning of 1878 78 per cent. of all the rails in tracks must have been of iron still, even if we assume that none of the steel laid was then worn out. Considering this, it is certainly very hard to believe that renewals of 5.5 per cent., indicating an average life of 18 years, have made good all the wear of the year. Yet the quantity which we have allowed for maintenance has been too great rather than too little, and we may be quite sure that not more than 5½ per cent. of the rails in the United States were renewed last year. We cannot help feeling that many of the roads which have much steel in their tracks have saved very largely in maintenance at the expense of capital, needing very few rails just now to replace the worn steel, but sure one of these years to need a great many, and then to show a material increase in maintenance expenses. It might be possible to believe that there would be an average life of 18 years if all the rails in the country were steel, but with more than three-fourths of them iron, such a life is hardly credible.

Of course rails should not be renewed until they need renewal. If a road is all laid with steel this year which will be one-fourth worn out in three years, but still with every rail good for nine years more, we are not going to be foolish enough to buy rails to represent the wear. But we should remember, none the less, that in these years our rail maintenance has virtually been provided out of capital, and that every dollar's worth of depreciation must be made good some day. Where but a tenth or so of the track has been laid with steel in any one year, the matter will adjust itself tolerably. Before the last iron is taken up, some of the steel will have to be replaced; but generally our roads have laid their main lines with steel much more rapidly, and consequently, after some years in which very few new rails are needed, will have to renew the whole track within a few years.

The reports of some of the most important railroads strengthen this conviction. They are buying very few rails, though they keep their tracks in first-class condition, and they report no renewal funds. All this has helped to make some of the extraordinarily low expenses per ton and per passenger per mile that have been reported recently; but it creates some uneasiness for the future, when the last available eighth of an inch has been worn from the steel rail-heads, and large renewals become indispensable.

The actual average *wear* of rails, however, is doubtless sure to grow less and less for many years to come, because a larger and larger proportion of the tracks will be of steel. In 1878, the steel consumed was sufficient to lay about 5,700 miles of track with 56-lb. rails, and was 55½ per cent. more than the total consumption of rails of all kinds for new construction. There have been consumed in the United States down to the close of 1878 about 2,700,000 short tons of steel rails, of which 2,500,000 were laid after 1871, and nearly 2,000,000 tons after 1873. The latter are doubtless still in the tracks for the most part. In 1878 the consumption was 560,000 tons, and this year it will be greater, though a larger proportion, probably, will go into new roads. It would be interesting to know precisely the mileage of steel tracks, but this is not now possible. If none of the steel had required renewal, the consumption would have sufficed to lay 27,400 miles with 56 lbs. rails. But though three-fourths of the tracks of the country are still of iron, doubtless a good deal more than half the traffic, perhaps two-thirds of it, is over steel tracks, and the saving to be made by future renewals of iron with steel will not begin to equal those which have been effected by the steel already laid.

Nevertheless, the tendency seems to be to make everything of steel. We know companies which, in building branches for which they expect only a very light traffic for many years, are unwilling to order iron, and in spite of a large increase (25 per cent.) in the mileage of new railroads from 1877 to 1878, the quantity of iron rails consumed decreased slightly. The last report of the American Iron and Steel Association shows the following production and importation of steel and iron for twelve years, all in tons of 2,000 lbs.:

	Production. Iron.	Steel.	Total.	Importation Iron	Steel.	Consumption.
1867	459,558	2,550	462,108	163,049		625,157
1868	499,480	7,225	506,714	250,091		756,795
1869	587,936	9,650	603,586	313,163		906,749
1870	586,000	34,000	620,000	399,153		1,019,153
1871	737,483	38,250	735,733	515,000	50,701	1,341,434
1872	905,930	94,070	1,000,000	381,064	149,786	1,530,850
1873	761,092	129,015	890,077	99,201	158,571	1,148,849
1874	584,469	144,944	729,413	7,796	100,486	837,695
1875	501,649	280,836	782,512	1,942	16 916	810,770
1876	467,168	412,461	879,629	287	.....	879,916
1877	332,540	432,169	734,709	.....	35	764,744
1878	322,890	559,795	882,685	.....	10	882,695

Rail production in this country, it will be noticed, has been well maintained through all these years of reduced construction, the decline in consumption being nearly balanced by the decline in importation. But the change from iron to steel is most remarkable. Since 1871 the production of steel has gone on increasing with great rapidity, while the production of iron has constantly decreased. Beginning with 1872 the percentage of steel has been in successive years, 9.4, 14.5, 19.9, 36.7, 47, 55.1 and 63.4 per cent. of the total production. Very likely with an increased construction of new road the production of iron will no longer decrease, or will even increase, but the steel production will evidently be larger this year than ever before. Still the old rate of increase will hardly be kept up. One of the largest works is not in operation, and all the works now making rails were employed also most of last year. If the present activity in construction is maintained, probably by next year the St. Louis works will be started up; but no new Bessemer works are now contemplated, and the increase this year will be chiefly due to the working of the present works to their full capacity, which will doubtless be required in order to supply the demand.

The production of iron will probably be nearly equal to the new construction (it always has been until last year), so that the steel may be employed chiefly for renewals, for which it has been used mainly heretofore, iron being good enough for most new roads. At last year's rate of production, about 5,700 miles could be renewed each year, and the steel production was equivalent to nearly 6 per cent of the total tonnage in tracks at the beginning of the year. At this rate (560,000 tons per year) it would take a long time to renew the iron still in tracks, which probably amounts to some 7,400,000 tons; but this iron is chiefly in tracks where it wears very slowly, and the demand for steel for renewals of iron is likely to be less than heretofore. Against this we shall have, and doubtless are now having, a demand for the renewal of old steel tracks. How great this latter demand will be no one can now say, for the reason that we do not know with any approach to accuracy what is the average life of the average steel rail. But the indications are (and that from results on tracks with the heaviest traffic) that this demand will be quite a moderate one, and it is quite probable that the works now in existence will be able for a long time to come to supply the whole average demand.

Effect of Railroads on Farming in the Eastern States.

The decline of farming in the East is commented upon by the New York *Commercial Bulletin* in an article which we copy elsewhere, and charged upon the railroads of those states. The article is remarkable as appearing in a journal which is especially devoted to the interests of the commerce of the city of New York, which, more than any other journal known to us, has been persistent in the demand that *through* rates to New York should be made lower, and has most bitterly opposed all schemes for the coöperation of the railroads by which alone can the great differences between through and local rates which it complains of be reduced. Some reduction is desirable, and if the railroads can succeed in coöperating, it is practicable; but, after all, the differences between through and local freights must remain very great. It is true that the value of agricultural land in New York is very much less than if the cost of transportation from the West to the East had not been reduced to the very low rates prevailing of late years; but it is not true that the New York railroads have had much to do with this. What has done more than anything else to put the farms of the Northwest on an equality with those of the East has been the Erie Canal—a transportation route owned by the state of New York. The New York railroads were built primarily for the state of New York, and it is solely by reason of efforts to get part of their support from traffic beyond the state that low through rates have been accepted. At higher rates—at rates yielding the average profit of the entire traffic of the road—the railroads could get none of this traffic. It is doubtless true that at times this traffic is carried for less than cost; but it certainly cannot be supposed that the railroads have done this voluntarily, or for any other reason than because they hoped thus to preserve to themselves a traffic which on the average left some profit over working expenses. Railroads are no fonder of working for nothing than other people, though they are compelled by force of circumstances to do so not infrequently.

The *Bulletin*, however, does not represent properly the effect of the railroads on farming in the East. While they have doubtless greatly changed the direc-

tion of agricultural industry, they probably have not at all or scarcely at all decreased the area cultivated. Their bad effect on Eastern farmers is shown almost exclusively by the price of land. If that was worth $100 an acre in 1860 and is worth but $20 now, it is cultivated just as much now as then. Agriculture does not progress at the same rate in the East as do other industries, because the good land was long ago all occupied. There is a natural limit to the progress of agriculture everywhere, because the area of land is limited. And the arrest in the growth of agricultural population has occurred in the West as well as the East, and for the same reasons. There are counties in Illinois still without large cities which showed no increase in country population from 1850 to 1860, and some decrease from 1860 to 1870. Most of the land was occupied as early as 1850 and utilized to some extent for pasturage where not cultivated, and what increase in cultivation has been made since has been done so largely by the use of machinery that fewer hands are needed now than then. There the transformations in agricultural industry have been just as striking in many parts as they can have been anywhere. Whole counties that produced little else than grain twenty or thirty years ago now actually import part of their breadstuffs. The change has been largely due to the chief cause of the transformation in New York—the rise of a large city and town population which must be supplied with many articles which cannot easily be carried far; but largely also because the farmers have acquired the capital necessary to stock their farms and make larger profits than were ever possible by grain-growing.

But it is these Illinois, Wisconsin, Indiana, Michigan and Ohio farmers whose land has really been reduced in value, or kept from rising as it would have done otherwise, by the low through rates of the railroads. They were assured a cheap outlet to the seaboard by the lakes and the Erie Canal; but Iowa, Minnesota and Missouri, and still more the territory west of the Missouri, would be absolutely cut of from the markets of the East but for the low through rail rates to the lakes. The Illinois corn-grower and the Ohio wheat-grower now have to compete with the Kansas and Nebraska farmers, who perhaps recently received their farm lands gratis from the government. The former pay much higher rates in proportion to distance over their own roads than do the Kansas farmers over the same roads; but nevertheless *the charges which they have to pay have been materially reduced by the addition of the through Western traffic.*

The *Bulletin* article is most useful to railroad men as showing the prejudices which are occasioned by the fearful railroad wars which often do, as at present, reduce the prices of transportation below the bare cost, and leave the whole burden of paying interest on the cost of the roads, and even part of cost of carrying through freight, on the local traffic. This is a condition of things which those who supply the local traffic have a right to complain of, but it ought to lead them to support instead of opposing the railroad managers in their efforts to secure paying rates on through traffic. The trouble is that they are usually not satisfied when through rates are made as high as they can be, even with the coöperation of all the railroads, unless those rates are as high per ton per mile as the local rates, which is almost never possible.

Record of New Railroad Construction

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Utah & Northern.—Extended from Snake River, Idaho, northward 7 miles. It is of 3 ft. gauge.

Utah Southern.—Extended from York, Utah, southward to Chicken Creek, 30 miles, completing the road.

Metropolitan Elevated.—Extended from 60th street to 103d street in New York, 2 miles.

Milwaukee, Lake Shore & Western.—Extended from Clintonville, Wis., northward to Honey Creek, 5 miles.

Louisiana Western.—The first track is laid from Orange, Tex., northeast 4 miles.

This is a total of 48 miles of new railroad, making 619 miles thus far this year, against 407 miles reported for the same time in 1878, and 461 miles in 1877.

THE UNEVENNESS OF MAINTENANCE EXPENSES is considered by a correspondent in connection with the plans for uniform state reports that have been submitted. There can be no doubt that there are very great fluctuations from year to year in the necessary expenses for maintenance, while the difference between years when road and rolling stock are left as long as possible and the following years when they are again put into first-class condition, is something gigantic. We suspect that a very large proportion of our most important roads have recently had much lighter expenses for rail renewals than their average expenditures on this account must be. They have had their tracks renewed with steel and have as yet but hardly begun to get to the end of the life of their steel rails. And something of similar effect has taken place in rolling stock maintenance. Here the saving has not been so much due to better material as to improved methods of conducting business. Managers have learned to keep the cars and locomotives at work a larger part of the time, and so do more work with the same equipment. In fact, some roads, while doing a larger business than ever before, have had part of their rolling stock laid up, though it had been provided, and was once thought to be necessary, for the proper conduct of a lighter traffic. Now the road which has thus found itself with a surplus of rolling stock has been able to reduce expenses for maintenance and renewals very largely, simply by wearing out the surplus. One check can be provided against the false impression given by such reports (for the policy may be perfectly legitimate and the only rational one), and that is by reporting *quantities* of supplies and labor used as well as expenditures. If the number of ties and tons of rails used in renewals are reported every year, we shall be able to judge pretty well for ourselves whether the maintenance expenses have been equal to the average; and probably very much the same thing could be done with rolling-stock maintenance, though that would require a much more complex statement.

When all is done, however, we need not expect that the accounts alone would give an absolute and exact idea of the course and condition of the property. That can only be done by an inspection and inventory in addition to the accounts. Something like this is contemplated by the Belgian corporation law, which provides for the appointment of inspectors and auditors from among the stockholders, the former to make an inventory of the property, and the latter to examine the accounts. The law, however, is said not to work very well, for reasons which would probably have as much effect here as in Belgium: both inspection and audit are made in a perfunctory way, because to make them effectivaly would take a great deal of time and skill, and the stockholders usually have confidence in their officers, and do not feel the need of keeping any checks on them until they have suffered greatly for the lack of them, as has happened recently in Belgium in some great enterprises. This—the indisposition of shareholders to insist on the control which it is possible and practicable for them to exercise—is the chief obstacle to the enforcement of any plan. They are more interested than any one else possibly can be, and yet they will not take the trouble to protect themselves. One reason for their apparent indifference is that the average stockholder has but a small fraction of his capital invested in any one company. He gives pretty much all his time and attention to his own individual business, and hardly takes time to answer questions which are directly submitted to him by his company's board. Those who have a large part of their fortune invested in a company are quite commonly directors of it, and so are supposed to control it, though often exough they know very little of its operations.

MINNESOTA is having a large share of the emigration to the West. For several years the growth of this state had been quite moderate, but in 1877 and 1878 there were great accessions. The bad harvest of last year seemed likely to arrest the new movement, and doubtless but for it the number of immigrants would now be much larger. But as it is, there is said to be a greater influx than ever before, and the government lands in the western part of the state are being occupied with great rapidity, the sales of railroad lands are large, and in the southwest and also on the line of the Northern Pacific the movement extends across the Minnesota line into Dakota, where there is still abundance of land, and in some parts very good land, to be had for the taking. This movement is of the utmost importance to the Minnesota railroads, which have not generally been profitable undertakings, but still last year were greatly extended in anticipation of the early occupation of the western part of the state and the country beyond. It is noticeable that when one road there begins an extension westward, all parallel roads follow it. In fact, they are in a manner compelled to do so, lest they be cut off from any share of the traffic from the country west of them. This year, aside from the extension of the Northern Pacific, which is further west than the territory now under consideration, there will be an extension of the northerly line of the St. Paul & Pacific so as to make a loop with the present line to Manitoba; an extension westward of the Hastings & Dakota line of the Chicago, Milwaukee & St. Paul, a long branch of the Chicago & Northwestern's Winona & St. Peter road from a point in Western Minnesota due west, probably as far as the James River in Dakota; an extension of the Sioux Falls Branch of the Sioux City & St. Paul (all in Dakota); a further extension of the Southern Minnesota, and, south of the latitude of Minnesota, an extension of the Iowa & Dakota Division of the Chicago, Milwaukee & St. Paul into Dakota a considerable distance. Last year Minnesota had a larger mileage of new railroad than any other state, and this year there promises to be an equal or greater extension of the Minnesota railroads, though a large proportion of it will be beyond the borders of that state. The new roads will nearly all contribute traffic to the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul roads, which at last seem likely to have some support from the vast territory west of their lines. They have had a very different experience from that of the roads extending westward and southwestward from Chicago. For years while Minnesota grew very moderately, and the country west of it scarcely at all, Nebraska, Kansas, Colorado and Texas were increasing immensely their production and swelling the traffic of such roads as the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, and the Chicago & Alton. It is not probable that the country west of Minnesota will ever be as productive as that west of Iowa and Missouri, but it is evident now that an attempt will be made to utilize it as far as practicable, and not leave it wholly a wildnerness, as it has been heretofore for the most part.

RATES TO MISSOURI RIVER POINTS were re-arranged Monday, by consent of all concerned, in such a way that the war of the Chicago and St. Louis roads may now be said to be confined substantially to the east-bound business, though the local west-bound rates are still lower than the late Association rates. The occasion of the change was the trouble concerning shipments by the trunk lines from Eastern cities; but the change will affect a business many times as large as this, and will particularly add to the earnings of the Chicago roads. Heretofore the rate from New York to Missouri River points has been the rate to Chicago, plus the local rate from Chicago. The Chicago roads had made this local rate 10 cents per 100 lbs., which brought down the through rate to 85 cents for first-class and 50 cents for fourth-class freight. The new tariff is made by adding the rates which the St. Louis roads have been making from St. Louis to Missouri River points to the rate from New York (or other Eastern city) to St. Louis, and the Chicago roads make their local rate nearly equal to the difference between the new rate thus made from New York to Missouri River points and the New York-Chicago rate.

The new rates from New York to St. Louis and the St. Louis-Kansas City rates, and their sums, which are the new rates from New York to Missouri River points, are, in cents.

	Class.			
	1.	2.	3.	4.
New York to East St. Louis	89	71	60	48
St. Louis Bridge	5	5	5	5
New York to St. Louis	94	76	65	53
St. Louis to Kansas City	25	25	20	10
New York to Mo. River points	119	101	85	63
New York to Chicago	75	60	50	40
Chicago to Mo. River points	45	40	20	15

As the Chicago roads have been getting but 10 or 15 cents on this business, the change will be much to their advantage, though the movement is in the opposite direction from that which they begun originally. It is not probable that the west-bound business of the two places would be affected by differences of rates to anything like the extent that the east-bound business is. And the Chicago roads are probably the most interested in keeping up the west-bound rates, because they are likely to have much the largest share of the great lumber traffic, which is probably greater (in amount) than all the rest put together. This business, however, does not come under any of the classes here named, and possibly lumber rates are not advanced with the rest, though we presume that they are.

The great conflict is over the east-bound business, and there are no signs of any end to that yet, unless this action concerning west-bound rates may be considered one.

THE ATLANTIC & GREAT WESTERN is not to have plain sailing for its proposed lease to the Erie. Mr. James McHenry is fighting the scheme with a desperate energy, which apparently has had considerable effect in England, though the statements made in some of his circulars and in other publications opposing the lease are in many respects ridiculously absurd. He has, however, succeeded in inducing respectable men, who carry weight with English investors, to take charge of an opposition scheme, and if nothing else is effected by this, it will at least make the plan of the reorganization trustees slower and costlier to carry out. The McHenry scheme contemplates a reorganization without foreclosure, which by the laws of Ohio may be effected by agreement of two-thirds of the shares and of the funded and floating debt; and the working of the road thereafter independently by the reorganized company, which is to borrow several millions to meet the immediate necessities on a mortgage prior to any of those now outstanding. If there is any one who will lend more money to the Atlantic & Great Western without other security than that road, this plan perhaps can be made to work, after a fashion. But when a company for many years has not been able to pay a cent of interest on a debt of about $2,500,000, it is not easy to find investors who will lend it $6,000,000, especially when it is not an improving property nor one which commands at its own stations a large amount of traffic. The McHenry committee reports a large number of assents from Atlantic & Great Western security-holders, but it carefully avoids saying what classes of securities they possess. Now, the shares of the company are absolutely worthless, and the third-mortgage bonds are not much better, and it would probably be possible for holders of one-tenth of the present market value of the company's securities to own one-half of the aggregate face value of the stocks and bonds. By no possible arrangement will it ever be possible for the Atlantic & Great Western to return more than a very small income to its proprietors, while its nominal capital is almost the largest in the world per mile of road owned. And unless some corporation with credit takes up the concern, or the security-holders make large advances out of their own pockets, it is hard to see how they (aside from the holders under the Ohio mortgage) can get anything out of it. But the hue and cry now raised is all based on the assumption that the road is a very valuable property.

"RAILWAY TICKET BROKERS" is the title of a compact and telling argument prepared by Mr. W. L. O'Brien, Genera Passenger and Ticket Agent of the Pittsburgh, Cincinnati & St. Louis Railway, in advocacy of a law prohibiting the sale of passenger tickets except by persons having formal certificates authorizing them to make such sales from the company issuing the tickets, a bill for which has been pending in the Ohio Legislature. Mr. O'Brien shows how the free sale

of unused parts of coupon tickets tends to change the latter, which were issued for the sake of the convenience of travelers and the railroad companies, into a means for extending through rates to local travel, and how the margin between the sums of the locals and the through is greatly limited by the provision of continuous passage tickets at lower rates than are charged for through tickets good until used. He urges that the differences in rates made by the railroad companies are reasonable, and that the latter ought to be supported in their efforts to collect of all alike their regular rates, especially when they provide (as the proposed bill requires them to do) for the redemption of unused limited tickets or parts of such tickets, the payment for the latter being fixed at the difference between the price of the whole ticket and the regular fare for the distance the passenger has actually traveled. "The chief objection to the traffic in tickets," says Mr. O'Brien, "is the facility it presents to ticket thieves and dishonest employés of railway companies for disposing of stolen tickets." This he illustrates by abundant statements of facts which show that certain ticket-brokers in Ohio have virtually kept "fences" for tickets, passes, etc. These statements show very strongly how much business is done by "scalpers" which no one can claim to be legitimate, and which is fraught with demoralization to the employés of railroads and danger to the public to whom the stolen goods are offered. Mr. O'Brien's argument has been printed in a pamphlet, and will be found useful wherever legislation is sought to remedy the great abuses which accompany the "scalping" business.

EAST-BOUND RATES seem not to have changed much during the past week, and have been quoted at 10 to 12½ cents per 100 lbs. from Chicago to New York, with one shipment reported at 7½. The indications are that little freight was accepted at less than 12½, as otherwise there could scarcely have been any lake and canal shipments. The latter have been greatly affected by the low rail rates, however, and Monday reductions in rates were made of ¼ cent per bushel on the lake and ½ cent on the canal, the present rates being 2 cents for corn and 2¼ for wheat from Chicago (or Milwaukee) to Buffalo, and 4 cents for corn and 4¼ for wheat from Buffalo to New York. This, with the elevator charge at Buffalo, makes the cost by water from Chicago to New York 6½ cents per bushel for corn and 7½ for wheat, while by rail a 12½-cent rate is 7 cents for corn and 7½ for wheat, and a 10-cent rate 5.6 for corn and 6 for wheat. At this time last year lake rates were lower rather than higher, but canal rates were considerably higher, the quotations being 1⅜ to 2 cents for corn and 2⅜ to 2¼ for wheat by lake, and 4¾ for corn and 5¼ for wheat by canal.

The Railroads and Middle States Farming.

A traveler through the Middle States of the Union cannot fail to be struck with the evidences of decadence of farming that meet the eye on every hand. In New York, New Jersey and Pennsylvania, agriculture has ceased to make any actual progress; relatively, it is on the decline, and this is not only in the more isolated sections, but in those that verge upon the great lines of travel. The farms have a neglected and poorly cultivated aspect; the homesteads are dilapidated; the implements are scant and mostly old, including few of the modern labor-saving inventions; and the farmers and their dependents show evidences of poverty that ill befit the reputed prosperity of the American yeoman. With the exception of a well-to-do few of exceptional enterprise, the utmost hope of the farmer is to eke out a bare living by much toil and little enjoyment. He has no longer any surplus to send to the market; he produces to supply merely his own necessary wants and the limited local consumption. He has consequently no chance for expansion, no incentive to ambition, and he drags along from year to year, getting worse rather than better. In very many cases, the product of the farm does not suffice to support the owner and pay the taxes; and a system of borrowing has consequently been adopted which has placed a large portion of the land under mortgage, the burdens of which are steadily bankrupting the owners. This is a true representation of the condition of two-thirds of the farmers of the Middle States—a picture that strangely contrasts with the condition of things that existed twenty years ago.

Taking New York state as a specimen of this relative decadence of the agricultural interest, we find that while the city and suburban population increased, between 1865 and 1875, from 2,413,708 to 3,256,768, or at the rate of 34.93 per cent., the rural population increased from 1,414,110 to 1,442,190, or at the rate of only 2 per cent. From the censuses of the United States and of our own state we have compiled the following statement, showing the acreage of improved lands, the number of animals and the product of the leading agricultural crops in this state in the years 1850, 1860 and 1874 respectively.

	1850.	1860.	1874.
Improved lands, acres	12,408,964	14,376,397	15,875,552
Horses, No.	447,014	503,725	526,083
Milch cows, No.	931,324	1,123,634	1,339,816
Sheep, No.	3,453,241	2,617,855	2,133,934
Swine, No.	1,018,252	910,178	438,906
Wheat, bush.	13,121,498	8,681,100	10,188,067
Rye, bush.	4,148,182	4,786,905	3,046,346
Corn, bush.	17,858,400	20,061,048	20,294,800
Barley, bush.	3,585,059	4,186,677	4,829,993
Oats, bush.	26,552,814	35,175,133	37,968,429
Total grain, bush.	65,265,953	72,890,753	76,327,635
Wool, lbs.	10,071,301	9,454,473	7,369,982
Irish potatoes, bush.	15,398,368	26,447,389	36,639,601
Butter, lbs.	79,766,094	103,097,279	111,087,489
Cheese, lbs	49,741,413	48,548,288	98,725,172
Hay, tons	3,728,797	3,564,787	5,440,612
Hops, lbs.	1,536,299	9,655,542	13,846,065
Population	3,097,394	3,880,735	4,698,958

From this comparison, it will be seen that dairy farming (which as been stimulated by the factory system), hay, potatoes and hop growing are almost the only branches of farming that made any progress between the years 1860 and 1874; these having been developed through the large growth of the city populations in the comparative absence of extraneous competition. The number of farm animals (horses, milch cows, sheep and swine) has diminished during the fourteen years from 5,155,392 to 4,008,736, or at the rate of 22¼ per cent. The five principal cereals have increased about 4¾ per cent. The wool crop has fallen from 9,454,473 lbs. to 7,369,982 lbs. Yet, while there was this preponderant backwardness in agriculture, the aggregate population of the state increased in the interval 818,223, or at the rate of 21 per cent. Thus the agricultural interest has utterly failed to keep pace with the general progress of the state; and therefore, relatively, farming is retrogressing. Nor is this the worst aspect of the case. The impoverished and debt-burdened condition of the farmers leaves no hope for their recuperation, but rather foreshadows a still worse state of things in the future. What we have here shown to exist in New York is but a specimen of the state of affairs in Connecticut, New Jersey and Pennsylvania also; and the conclusion to be drawn is that, in this group of states, farming is verging toward a condition in which it will be virtually confined to dairy products and vegetable growing, to the limited extent required to supply the city populations, while the larger and more solid branches must steadily decline.

These are the results that have followed the introduction of railroads. The four states thus affected are preëminently supplied with railroad facilities. They are more thickly gridironed with railways than any other part of the country, having 20,230 miles of track, provided at a cost of $990,000,000. The companies have been granted the most valuable franchises that have ever been conceded to railroads, in the expectation, first of all, that large benefits would accrue to the citizens of these respective states, and therefore with the implied understanding that the interests of the people making these grants should be especially considered. Yet the fact is undeniable that the period of the chief development and prosperity of these roads has been coincident with the decadence of the agricultural interests of the respective states. This coincidence is not an accident; it is clearly traceable to causes connected with the policy of the railroads. The cause of the decadence is not in the lack of vitality and resource in the lands of the suffering states. The lands are good; their owners or occupiers have had the means of properly cultivating them, and, with the enjoyment of fair facilities for transportation, they could be made largely productive and their cultivation might become remunerative. How, then, does it come to pass that in this large section of fine farming country agriculture is being gradually crushed out?

The answer is to be found in the policy of the railroads. A system of discrimination in favor of the Western farmers has been uniformly acted upon. Added to the great natural advantages the Western farmer has enjoyed through getting fertile virgin lands at a nominal price, the railroads have brought his produce to the Atlantic at a nominal charge, as compared with that levied on the farmers of the seaboard states. Competition between the trunk roads at points where they meet has fixed the charges for carrying Western products at rates frequently below the actual cost of carriage, and generally so low as to leave no fair profit on the cost of the service; and the state farmers on the route of the road, instead of being permitted to enjoy their advantage of contiguity to the market, have been taxed to make up for the deficiency of charges for bringing forward the Western crops; in other words, the farmers of the Middle States have been compelled to contribute upon all their products sent to the ports a large percentage of their value to enable the Western farmers to send their produce to market to compete with them. The farther the Western farmer migrated westward, the more aggravated this pressure upon the local farmer became; until at last a point has been reached at which the seaboard farmers are virtually shut out from the use of the railroads, except for a few articles, and all they can do is to produce for a narrow, strictly local consumption; in which also they are subject to competition from the cheaply-carried Western products being brought to their door.

It is useless to cumber our remarks with specimens of the gross inequality between the charges for Western and way freight, for they are matters of common knowledge, grain being brought from Chicago at rates which, allowing for distance, are equivalent, on an average, to one-eighth only of those charged to the farmers of our own state, excepting those fixed for competitive points in the state, such as Rochester, Utica, etc. Under such a system, no other fate could happen to the farmers of the Middle States than that which is befalling them with such destructive effect. In the states which are geographically best situated for supplying the export markets, which should have an advantage in the cost of carriage to port of 5 to 10 cents per bushel over Western states, production is suppressed by rates for carriage which shut the farmer out of the market. Thus, by an entirely arbitrary regulation of rates, agriculture is being extinguished in one section and artificially built up in another. What the result will be when the trunk roads have thus dried up the sources of their local traffic, it much concerns the railroad companies to consider. Having relatively less local business that they can tax to support the Western, they will be driven to charge proportionally more for carriage from the West; and the increased toll on Western products will put that section at a disadvantage in supplying the European markets, which in turn will re-act upon Western agriculture, none too profitable already, and produce in that section a severe relapse. This sort of outcome from the artificial stimulus now applied to Western development is inevitable sooner or later; and, when it arrives, the railroads will have reason enough to regret their folly in having slaughtered the agricultural interests of the more favorably situated sections.

In the meantime, the farmers of this group of states should have something to say about the treatment to which they are subject. They constitute an important element in that sovereign power of the people from which the railroads received their charters. The powers they conferred upon these corporations have been turned directly against their interests. Those powers have been exercised to protect the foreign producer at the expense of the state farmer; and this effect comes about through no natural and equitable arrangements, but through a system of charges that wholly disregards the comparative cost of the service rendered to the home citizens and to the foreign respectively. Such a policy of discrimination amounts to a direct breach of faith between the railroads and the states to which they owe their privileges; and, unless the farmers are insensible to their endangered interests, they will lose no time in inquiring what measures should be taken for remedying the abuses of corporate power that are thus surely ruining them.—*New York Commercial Bulletin, May 23.*

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Louisville & Nashville, special meeting, at the office in Louisville, Ky., June 11.

Ulster & Delaware, annual meeting, at the office in Rondout, N. Y., June 11.

Washington City, Virginia Midland & Great Southern, general meeting of bondholders to consider a plan of settlement, at the National Mechanics' Bank in Baltimore, June 26, at noon.

Railroad Conventions.

The Railroad Commissioners of the various states will hold their third annual convention at Saratoga Springs, N. Y., June 10.

The *Master Car-Builders' Association* will hold its annual convention at the Grand Pacific Hotel, in Chicago, beginning on Tuesday, June 10.

The *American Society of Civil Engineers* will hold its eleventh annual convention in Cleveland, O., beginning June 17.

The *Yard-Masters' Mutual Benefit Association* will hold its fifth annual convention at the Gibson House, Cincinnati, June 24.

Dividends.

Dividends have been declared as follows:

Car Trust of Pennsylvania, 1½ per cent., quarterly, payable June 2.

Chicago & Northwestern, 1¾ per cent., quarterly, on the preferred stock, and 2 per cent., semi-annual, on the common stock, both payable June 28.

Connecticut River, 4 per cent., semi-annual, payable July 1.

Mail Service Extensions.

Mail service has been ordered over railroad lines as follows:

Central Branch, Union Pacific, service extended from Beloit, Kan., to Cawker City, 18.90 miles.

Foreclosure Sales.

The *Southern Railroad of Long Island*, was sold at Jamaica, N. Y., June 3, under a decree of foreclosure of the second mortgage, the sale being made subject to the first mortgage for $750,000. Bought by James B. Wallace, Trustee, for account of the bondholders. The foreclosure has been sued out in pursuance of a plan of reorganization agreed on by the bondholders some time ago. In addition to the first mortgage, there were $1,500,000 second-mortgage and $405,000 third-mortgage bonds, which are wiped out by the foreclosure. The road extends from Brooklyn, N. Y., to Patchogue, 52 miles, with 11 miles of branches, and is leased to the Long Island Company.

The Painesville and Youngstown Railroad was sold in Cleveland, O., June 2, under foreclosure of mortgage and bought for $192,000 by Henry B. Payne, Wm. J. Hitchcock and Miles R. Martin. It has been offered for sale several times but no bids were made for it. The road is of 3 ft. gauge and extends from Painesville, O., to Youngstown, 62 miles. By the latest statement there were $923,000 first mortgage, $250,000 second mortgage, and $37,300 income bonds. The road has not been a valuable property, barely earning its running expenses. It is so located as to meet competition at every point on its line where there is any considerable traffic.

Purchasing Agents' Association.

The annual convention met in Louisville, Ky., May 20, and continued in session three days. There were present C. M. Higginson, Chicago, Burlington & Quincy; J. H. Holway, Atlantic & Great Western; A. W. Sumner, Northern Central; E. W. Porter, Canada Southern; J. C. Febiger, Jr., Chicago, St. Louis & New Orleans; J. H. Stewart, Cincinnati, Lafayette & Chicago; Allan Bourn, Michigan Central; W. R. Shelby, Grand Rapids & Indiana; E. P. Miller, Indiana, Bloomington & Western; B. F. Masten, La Fayette, Bloomington & Muncie; G. C. Breed, Louisville & Nashville; L. McLeod, Louisville, Cincinnati & Lexington; G. R. Cobleigh, Pekin, Lincoln & Decatur; W. S. Cuddy, St. Louis, Iron Mountain & Southern.

Mr. Higginson presided. Secretary Thompson not being able to attend, W. A. Smith, of the *Railway Purchasing Agent*, acted as Secretary.

After transacting the usual routine business, the Association entered upon verbal discussion of matters of interest to the members. The sollowing subjects were talked over: Axles; cylinder and valve lubricants—animal oils as compared with mineral oils; bolster springs; methods of carrrying stock; manufactured material—should it be made by the company or bought; old material, its classification and distribution; methods of distributing stationery and printing; individual car mileage; passenger equipment.

It was resolved to meet next year in Chicago. Members were entertained by an excursion to the Mammoth Cave and in other ways.

New England General Ticket & Passenger Agents' Association.

A regular meeting was held at the Parker House, Boston, May 21, with a full attendance.

The names of John Lovejoy, General Ticket Agent, Rockland, Mount Desert & Sullivan Steamboat Company, and J. W. Flavin, General Ticket Agent, Nashua & Lowell Railroad, were proposed for membership, and they were duly elected.

The question of an amendment to Article 6 of the constitution, presented at the last meeting was up for action. Lost.

On motion, the Association went into a committee of the whole to take up the matter of summer rates.

At 4 o'clock, p. m., a schedule of summer rates was reported by the committee of the whole, which on motion was adopted by the Association.

The meeting then adjourned.

East-Bound Pool Meeting.

The meeting of the Trunk Line and Western connections to arrange for the pooling of Chicago east-bound business met at Niagara Falls, June 4, representatives of a large number of roads being present. Among the prominent officers present were Trunk Line Commissioner Albert Fink; John King, Jr., Vice-President of the Baltimore & Ohio; J. N. McCulloch, Vice-President, and Wm. Stewart, General Freight Agent, of the Pennsylvania Company; G. R. Blanchard, Assistant to the President; R. C. Vilas, General Freight Agent; S. Little, Auditor, and E. N. Frisbie, General Coal Agent, of the New York, Lake Erie & Western; H. R. Duval, General Manager, and T. W. Lewis, Assistant Manager, of the Great Western Dispatch; H. C. Vilas, General Manager of the South Shore Line; L. J. Sargent, Traffic Manager, and J. A. Moore, Assistant General Freight Agent, of the Grand Trunk; J. H. Rutter, Traffic Manager of the New York Central; A. J. Cassatt, Vice-President of the Pennsylvania; John Newell, General Manager of the Lake Shore; H. B. Ledyard, General Manager of the Michigan Central; E. S. Washburn, General Manager of the Hoosac Tunnel Line; C. L. Hartwell, General Freight Agent of the Fitchburg; H. B. Hibbard, General Freight Agent of the Indianapolis & St. Louis; Lucien Hills, General Freight Agent of the Cleveland, Columbus, Cincinnati & Indianapolis; D. S. Gray, General Manager of the Union line; H. J. Hayden, General Freight Agent of the Boston & Albany; J. B. Dutcher, Live Stock Manager of the New York Central; Wm. Bliss, General Manager of the Boston & Albany; G. B. Spriggs, General Freight Agent of the Great Western; Colonel F. D. Grey and James Bald, of London, England, directors of the Great Western; L. Millis, General Manager of the National Despatch; George Darling, General Mana-

ger of the White Line; S. D. Caldwell, General Manager of the Red Line.

Most of the day was taken up by informal discussion, and the meeting did not begin until afternoon, when it organized by electing Trunk Line Commissioner Fink Chairman, and Isaac Markens, Secretary. The order of business was then settled and committees appointed, to which all business was referred. After a short discussion on live-stock business, the meeting adjourned until the next day.

ELECTIONS AND APPOINTMENTS.

Baltimore & Potomac.—At the annual meeting in Baltimore, June 4, the following directors were chosen: A. J. Cassatt, George B. Roberts, George Small, B. F. Newcomer, W. T. Walters, Oden Bowie, Dr. Eli J. Henkle, Samuel Cox. The board reëlected Oden Bowie President; A. J. Cassatt, Vice-President; John Crowe, Secretary and Auditor; John S. Leib, Treasurer.

Boston & New York Air Line.—At the annual meeting in Middletown, Conn., June 2, the following directors were chosen: W. H. Hayward, Colchester, Conn.; Geo. S. Moulton, Willimantic, Conn.; J. N. Camp, Middletown, Conn.; H. G. Lewis, S. E. Baldwin, New Haven, Conn.; T. L. Watson, Bridgeport, Conn.; Ripley Ropes, Brooklyn, N. Y.; E. Ellery Anderson, D. B. Hatch, H. B. Hammond, Samuel S. Sands, New York. The only new director is Mr. Baldwin, who succeeds Isaac Anderson. The board reëlected E. Ellery Anderson, President; H. B. Hammond, General Manager; T. L. Watson, Secretary; D. B. Hatch, Treasurer.

Canada Southern.—At the annual meeting in St. Thomas, Ont., June 4, the following directors were chosen: Samuel F. Barger, Sidney Dillon, Augustus Schell, Wm. L. Scott, James Tillinghast, Wm. H. Vanderbilt, Cornelius Vanderbilt, E. D. Worcester, E. A. Wickes. There is no change from last year.

Central Branch, Union Pacific.—Mr. H. V. Faries has been appointed Master Mechanic, in place of George Benedict, resigned. Mr. Faries was for a number of years Master Mechanic of the Atchison, Topeka & Santa Fe.

Central Iowa.—The board has elected Isaac M. Cate President; Russell Sage, Vice-President; D. N. Pickering, Superintendent and Treasurer *pro tem.*; Russell Sage, C. Alexander and G. E. Taintor, Executive Committee.

Chesapeake & Delaware Canal.—At the annual meeting in Philadelphia, June 2, A. C. Gray was chosen President, with the following directors: J. R. Baker, T. R. Biddle, G. S. Benson, Charles Dutilh, J. C. Fisher, H. C. Ford, J. F. Gilpin, C. A. Hutchinson, Mahlon P. Hutchinson, H. Pratt McKean, Charles Platt, David Scull, Edwin Swift, Isaac V. Williamson.

Chesapeake & Ohio Canal.—At the annual meeting in Annapolis, Md., June 2, A. P. Gorman was reëlected President, with the following directors: M. Bannon, James G. Berrit, B. B. Crawford, H. G. Farnandis, Patrick Hamil, John Humbird. An opposition ticket was voted by all the stockholders except the State of Maryland.

Chicago & Alton.—Mr. Chas. H. Foster has been chosen Secretary and Treasurer, in place of W. M. Larrabee, resigned. He has been Mr. Larrabee's assistant for several years.

Chicago, Iowa & Nebraska.—At the annual meeting, May 20, the following directors were chosen: John B. Alley, F. L. Ames, John I. Blair, John Bertram, S. C. Burr, Prince S. Crowell, Wm. F. Glidden, Benjamin A. Fuller, Edward Johnson, David P. Kimball, Joseph Nickerson, S. L. Thorndike, Horace Williams. The road is leased to the Chicago & Northwestern.

Chicago & Northwestern.—Mr. John E. Blunt has been appointed Chief Engineer of the Winona & St. Peter and its proposed extension into Dakota. He was an engineer of the company years ago, but left it to take charge of the construction of what are known as the "Hinckley roads."

Chicago, Rock Island & Pacific.—At the annual meeting in Chicago, June 4, the following directors (one-third of the board) were reëlected: Ransom R. Cable, Rock Island, Ill.; Hugh Riddle, Chicago; Wm. L. Scott, Erie, Pa.; Sidney Dillon, David Dows, New York. The board reëlected Hugh Riddle, President; David Dows, Vice President; Francis H. Tows, Secretary and Treasurer.

Cincinnati Southern.—The officers of the Cincinnati Company, which now leases this road, are: President, W. H. Clement; Secretary, H. H. Tatem; General Superintendent, Samuel Woodward; General Freight and Passenger Agent, E. P. Wilson; Auditor, R. L. Pomeroy; Paymaster, John Swaysey, Jr.; Chief Train Dispatcher, Samuel Hunt.

Concord.—At the annual meeting in Concord, May 27, the following directors were chosen: Benjamin A. Kimball, Josiah Minot, Concord, N. H.; Samuel N. Bell, Frederick Smyth, Manchester, N. H.; Joseph P. Pitman, Laconia, N. H.; Dexter Richards, J. Thomas Vose, Boston.

Concord & Claremont.—The following officers have been elected for the ensuing year: President, George E. Todd, Concord, N. H.; Clerk, John Y. Mugridge, Concord, N. H.; Treasurer, George A. Kettell, Boston.

Des Moines & Minneapolis.—Mr. John B. Alley, of Boston, has been chosen a director, in place of J. B. Stewart, resigned.

Franklin Telegraph.—At the annual meeting in Boston, June 4, the following were elected: President, T. T. Eckert; Directors, E. D. Morgan, Augustus Schell, John R. Duff, H. McK. Twombly, Sidney Dillon, Dr. Norvin Green, W. J. Syms, John H. Mortimer; Clerk, James G. Harris; Treasurer, A. B. Chandler.

Illinois Central.—At the annual meeting in Chicago, May 28, the following directors (one-fourth of the board) were chosen for four years: A. G. Dulman, Stuyvesant Fish, W. Bayard Cutting, all of New York. Mr. Cutting is a new director, succeeding Constantine Menelas, who decline a reelection.

Directors and officers for the following leased lines were chosen at the same time: *Chicago & Springfield.*—President, W. K. Ackerman; Secretary, W. J. Maurice; Treasurer, J. C. Willing. *Kankakee & Southwestern.*—President, W. K. Ackerman; Directors, B. F. Ayer, L. V. F. Randolph; Secretary, John Dunn; Treasurer, J. C. Willing.

Iowa Falls & Sioux City.—At the annual meeting, May 21, the following directors were chosen: John B. Alley, Oliver Ames, John I. Blair, D. C. Blair, Prince S. Crowell, J. Vandeventer, Horace Williams. The road is leased to the Illinois Central.

Joplin.—At a meeting of the board held in Girard, Kan., May 26, Mr. E. R. Moffat having resigned his position as President, Hon. James Baker was elected President, and C. W. Rogers, General Manager.

The following appointments are announced as of the same date: E. H. Brown, Superintendent; T. E. Cassidy, General Freight Agent; D. Wishart, General Passenger Agent; James Hanna, Auditor; F. F. Randolph, Cashier; C. D. Kelly, General Baggage Agent. The new officers are all also officers of the St. Louis & San Francisco Company, which now controls this road.

Kentucky Central.—At the annual meeting in Covington, Ky., May 27, the following directors were chosen: Charlton Alexander, Paris, Ky.; Wm. Ernst, J. W. Stevenson, Covington, Ky.; R. P. Bowler, Elliott H. Pendleton, George H. Pendleton, Peter Zinn, Cincinnati. The board elected Wm. Ernst, President; Elliott H. Pendleton, Vice-President and Treasurer; Charles H. Bronson, Secretary; J. W. Stevenson, Counsel; R. P. Bowler, General Manager. Mr. Ernst succeeds George H. Pendleton, now United States Senator from Ohio, as President, and is succeeded by Elliott H. Pendleton as Treasurer. Mr. Bowler, now General Manager, was before Purchasing Agent.

Lake Erie & Louisville.—Mr. Wm. B. Howard, of Chicago, has been chosen General Manager.

Littlestown.—At the annual meeting recently the following were chosen: President, Wm. McSherry; Directors, A. J. Frey, George D. Klinefelter, Joseph L. Shorb, W. Latimer Small, George Stonesifer, John L. Young; Secretary and Treasurer, George Stonesifer. The road is leased to the Pennsylvania.

Manchester & Lawrence.—At the annual meeting, May 30, the following directors were chosen: Ezekiel A. Straw, Nathan Parker, Benjamin E. Martin, Manchester, N. H.; Edward A. Abbott, Asa Fowler, Concord, N. H.; Joseph W. Smith, Andover, Mass.; Wm. A. Tower, Boston.

Missouri, Kansas & Texas.—The new board has elected D. Oakes Clark President; George C. Clark, First Vice-President; John T. Agnew, Second Vice-President; H. B. Henson, Secretary and Treasurer.

Nashville & Florence.—The officers of this Tennessee company are: President, G. H. Nixon; Vice-President, E. Kuhn; Secretary, Henry Nixon.

Nashua & Lowell.—At the annual meeting in Nashua, N. H., May 28, the following directors were chosen: Wm. W. Bailey, Francis A. Brooks, Cornelius V. Dearborn, Francis V. Parker, Albert M. Shaw, David Skillings, Jeremiah W. White; Clerk, Orrin C. Moore; Treasurer, Cornelius V. Dearborn.

Nashua & Rochester.—At the annual meeting in Nashua, N. H., May 29, the following directors were chosen: Joseph C. Burley, Francis H. Dewey, A. H. Dunlap, J. C. Eastman, Charles Holman, Francis H. Kinnicut, Aaron W. Sawyer, E. B. Stoddard, Charles C. Turner, Edwin Wallace, Charles H. Waters, George P. Westcott, Charles E. Whitin. The road is leased to the Worcester & Nashua.

New York Central & Hudson River.—At the annual meeting in Albany, N. Y., the following directors were chosen: William H. Vanderbilt, Cornelius Vanderbilt, William K. Vanderbilt, Frederick W. Vanderbilt, Augustus Schell, Samuel F. Barger, Joseph H. Harker, Chauncey M. Depew, John E. Burrill, James H. Rutter, New York; Chester W. Chapin, Springfield, Mass.; James M. Marvin, Saratoga Springs, N. Y.; John Allen, Jr., Buffalo, N. Y. Over $63,000,000 of stock was voted upon.

Northern (New Hampshire).—At the annual meeting in Concord, N. H., May 29, the following directors were chosen: George W. Nesmith, Franklin, N. H.; Josiah H. Benton, Jr., George E. Todd, Concord, N. H.; Uriel Crocker; Edward Lawrence, Francis B. Hayes, Albert M. Shaw, Boston. Messrs. Todd and Shaw are new directors, replacing John A. Burnham and Josiah Minot. Mr. Todd has been Superintendent for many years. The board elected George W. Nesmith President; Wm. L. Foster, Clerk; Geo. A. Kettle, Treasurer.

Pacific Mail Steamship Co.—The new board has elected Capt. John Riley President; J. B. Houston, Vice-President.

Pennsylvania.—Mr. W. Hayward Myers has been appointed Road Supervisor of Division No. 3, Philadelphia Division, in place of C. C. F. Bent, promoted.

Pennsylvania Company.—At the annual meeting in Pittsburgh, June 3, the following directors were chosen: J. N. McCullough, Thomas D. Messler, Wm. Shaw, Pittsburgh; Alexander Biddle, J. N. DuBarry, S. M. Felton, H. H. Houston, Wistar Morris, Henry M. Phillips, George B. Roberts, Thomas A. Scott, J. Price Wetherell, Philadelphia, President.

Peterboro.—At the annual meeting in Nashua, N. H., May 28, the following were chosen: S. A. Abbott, John H. George, George W. Gill, George A. Ramsdell, James Scott, Edward Spaulding, George Stark; Clerk, Gilman C. Shattuck. The road is leased to the Nashua & Lowell.

Pittsburgh, Cincinnati & St. Louis.—Mr. C. C. F. Bent has been appointed Road-Master of the First Division, Columbus, Chicago & Indiana Central, from Columbus, O., to Indianapolis, Ind. Office in Richmond, Ind. Mr. Bent was recently Road Supervisor on the Philadelphia Division, Pennsylvania Railroad.

Mr. C. R. Fitch has been appointed Train-Master of the Pittsburgh Division, with office at Steubenville, O.

Portland, Saco & Portsmouth.—At the annual meeting in Kittery, Me., June 2, the following directors were chosen: John B. Brown, George E. B. Jackson, Portland, Me.; Samuel C. Lawrence, Medford, Mass.; S. Lothrop Thorndike, Cambridge, Mass.; George P. King, E. B. Phillips, Alfred P. Rockwell, Boston. The only new director is Mr. Phillips, who succeeds Wm. H. Y. Hackett, deceased. The road is leased to the Eastern.

Poughkeepsie, Hartford & Boston.—Mr. Edward Ellsworth has been chosen Secretary and Treasurer in place of A. Swain, deceased.

Purchasing Agents' Association.—At the annual convention in Louisville, May 22, the following officers were chosen: President, E. W. Porter, Canada Southern; First Vice-President, A. W. Sumner, Northern Central; Second Vice-President, E. P. Miller, Indiana, Bloomington & Western; Treasurer, G. C. Breed, Louisville & Nashville; Secretary, W. A. Smith, Editor of the *Railway Purchasing Agent.*

Richmond, York River & Chesapeake.—Mr. Thomas Clyde has been chosen President, in place of R. S. Burrows, resigned.

St. Louis & Southeastern.—Mr. H. W. Gardner, Paymaster, is appointed Purchasing Agent also.

Savannah, Skidaway & Seaboard.—At the annual meeting in Savannah, Ga., May 28, the following directors were chosen: George W. Anderson, T. Arkwright, Henry Brigham, J. E. Gaudry, A. L. Hartridge, James W. Lathrop, Clavius Phillips, Jacob Rauers, Joseph B. Ripley. The board elected A. L. Hartridge, President; George W. Anderson, Vice-President; R. H. Footman, Secretary and Treasurer; G. A. Mercer, Attorney; E. J. Thomas, Superintendent.

Sioux City & Pacific.—At the annual meeting, May 21, the following directors were chosen: Horace Williams, Clinton, Ia.; James Blair, Scranton, Pa.; D. C. Blair, Belvidere, N. J.; John I. Blair, Blairstown, N. J.; Prince S. Crowell, East Dennis, Mass.; Oliver Ames, F. L. Ames, North Easton, Mass.; John B. Alley, Joseph Nickerson, Boston.

Texas & St. Louis.—Messrs. M. C. Humphrey, J. D. Goldman, H. M. Senter and James L. Sloss have been chosen directors to represent the new St. Louis interest in the road. Col. J. W. Paramore is Financial Agent, with office in St. Louis.

Texas Western.—The officers are now as follows: A. M. Gentry, President; T. M. Scanlan, Vice-President; S. M. McAshan, Secretary; J. G. Tracy, Trustees' Agent and General Manager.

Toledo, Delphos & Burlington.—The directors of this new consolidated company are: C. A. King, A. H. McVey, Toledo, O.; J. Boehmer, Delphos, O.; W. J. Craig, Bluffton, Ind.; G. J. Bippus, Huntington, Ind.; A. G. Hatry, H. R. Low, Pittsburgh; A. N. Martin, H. Watkins, New York.

Union Pacific.—The following appointments of Government directors for the ensuing year have been made: Charles C. Hausel, of Nebraska; George B. Smyth, of Iowa; Ralph P. Buckland, of Ohio; Daniel Chadwick, of Connecticut, and Nathaniel Niles, of New Jersey. Mr. Niles succeeds Charles Francis Adams, Jr.; he is a lawyer, has been Speaker of the New Jersey House of Assembly, and is highly respected in that state for uprightness and ability.

Wasatch & Jordan Valley.—The officers of this company are: C. W. Schofield, President; G. M. Young, Secretary and Superintendent.

Wisconsin Central.—At the annual meeting in Milwaukee, May 29, the following directors (one-third of the board) were chosen for three years: Charles L. Colby, Milwaukee, Wis.; E. E. Barney, Dayton, O.; E. H. Abbott, Cambridge, Mass. The board elected Charles L. Colby President.

PERSONAL.

—Mr. George Benedict has resigned his position as Master Mechanic of the Central Branch, Union Pacific.

—Mr. W. M. Larrabee, now in advanced years, has resigned his position as Secretary and Treasurer of the Chicago & Alton Company on account of ill health. He has been 15 years with the company and was previously Treasurer of the old Galena & Chicago Union, a most faithful and painstaking official, who will be remembered for his kindliness and thoughtfulness as well as for the proper performance of his duties.

—Mr. E. S. Wills retired June 1 from his position as General Agent of the Central Branch, Union Pacific road.

—Mr. Dudley R. Chesebro, Master Carpenter of the New New York, Providence & Boston road, died in Stonington, Conn., May 30, aged 61 years. He had been on the road 28 years.

—Mr. W. W. Longstreth, a prominent Philadelphia merchant and a large owner of coal property, died at his residence in that city June 3, aged 77 years. His health has been failing for several years. About 20 years ago Mr. Longstreth was chosen President of the Beaver Meadow Railroad Company, and when that company was consolidated with the Lehigh Valley he became President of the consolidated company, holding the office till 1868, when Judge Packer succeeded him. Mr. Longstreth is the third President or Ex-President of the Lehigh Valley who has died within a few months, the others being Judge Packer and Mr. Fell.

—Mr. A. G. Thompson, Purchasing Agent of the St. Louis & Southeastern, has resigned that position, and accepted the agency of the company at Mt. Vernon, Ill.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

	1878-79.	1877-78.	Inc. or Dec.	P. c.
Year ending March 31:				
Boston, Concord & Montreal	$500,550	$654,272	D. $63,722	9.7
Net earnings	201,619	201,100	I. 519	0.3
Four months ending April 30:	1879.	1878.		
At., Miss. & Ohio	$482,260	$516,508	D. $34,248	6.6
Kan. City, St. Joe & Council Bluffs	531,381	501,808	I. 29,573	5.9
Kansas Pacific	1,184,897	928,620	I. 256,277	27.6
Net earnings	473,749	277,315	I. 196,434	70.8
Southern Minnesota	102,397	238,590	D. 76,193	31.9
Month of April;				
Atlantic & Gt. Western	$327,790	$281,654	I. $46,136	16.4
At., Miss. & Ohio	118,113	126,931	D. 8,818	6.9
Southern Minnesota	42,982	59,823	D. 16,841	28.2
Third week in May:				
Atchison, Topeka & Santa Fe	$153,000	$69,698	I. $83,302	119.5
Chicago & Alton	105,208	97,048	I. 8,160	8.4
Chi. & Eastern Illinois	16,885	15,606	I. 1,279	8.2
Hannibal & St. Joe	27,269	30,773	D. 3,504	11.4
Kansas Pacific	80,245	60,784	I. 25,461	41.9
Mo., Kansas & Texas	47,596	44,592	I. 3,004	6.7
St. Louis, Iron Mt. & Southern	80,828	65,814	I. 15,014	22.8
Wabash	72,370	86,209	D. 13,839	16.1
Week ending May 23:				
Great Western	$68,947	$83,136	D. $14,189	17.1
Week ending May 24:				
Grand Trunk	$155,114	$151,959	I. $3,155	2.1

Grain Movement.

Receipts and shipments, and shipments by rail, of grain of all kinds at the eight reporting Northwestern markets, and receipts at the seven Atlantic ports have been, in bushels, for the week ending May 17 for the past six years, and also for the week ending May 24, as follows:

	Northwestern				
	Shipments				
Week ending May 17:	Receipts.	Total.	By rail— Bushels.	P. c.	Atlantic receipts.
1874	3,830,515	4,110,859	904,240	22.0	3,492,012
1875	2,280,422	2,416,771	850,029	35.2	1,891,558
1876	2,622,020	3,618,474	2,016,304	55.7	3,941,860
1877	2,506,649	1,997,738	758,450	37.9	2,575,025
1878	4,896,219	4,115,751	1,866,111	45.4	6,359,345
1879	3,510,383	6,226,747	1,982,501	31.8	4,549,127

	Northwestern				
	Shipments				
Week ending May 24:	Receipts.	Total	By rail— Bushels.	P. c.	Atlantic receipts.
1874	5,970,562	3,595,353	956,626	25.9	3,526,682
1875	2,705,782	2,782,468	1,003,242	35.8	2,661,075
1876	3,286,744	3,567,864	1,820,456	51.0	5,316,566
1877	2,294,405	2,330,304	794,342	34.1	3,506,828
1878	5,929,890	4,907,025	1,957,051	39.9	6,117,072
1879	3,713,978	4,802,116	2,470,084	51.5	5,977,584

It appears that in both of the weeks named the receipts at Northwestern markets were much less this year than last, but their shipments for the week ending May 17 were very much larger than in any corresponding week, and, indeed, were never before equalled except in the last week of August and the first week of September last year. These shipments appear to have been exceptional, for those for the following week (ending May 24), have often been exceeded when navigation was open both spring and fall.

The amount shipped by rail is extraordinarily large both weeks, for a week when navigation is open. In the latter week it is 51¼ per cent. of the total shipments, but of these a considerable portion comes from places that are not on the lakes.

The Atlantic receipts are but slightly affected the first week but very largely the second by arrivals by the Erie Canal, which tend to increase New York's share. The following shows the bushels and percentage of the total received at each Atlantic port each of the two weeks:

	Bushels week ending—		P.c. week ending	
	May 17.	May 24.	May 17.	May 24.
New York	1,465,049	2,868,897	32.2	48.0
Boston	437,558	403,850	9.6	6.7
Portland	3,700	3,700	0.1	0.1
Montreal	297,265	538,560	6.5	9.0
Philadelphia	1,163,800	1,089,000	25.6	18.2
Baltimore	930,750	722,750	20.5	12.1
New Orleans	251,005	350,827	5.5	5.9
Total	4,549,127	5,977,584	100.0	100.0

Substantially the whole gain was made by New York, which, as usual for a few weeks after lake navigation opens and the Erie Canal boats have not had time to arrive, had fallen much below its usual position. For the whole winter its proportion of the whole had been about 40 per cent., but for the three weeks ending May 17 they were but 30.6, 26.0 and 32.2 per cent., respectively.

There does not appear to be any very marked effect of the prevailing extremely low rail rates from the West. In 1876, when the roads had cut down to 20 cents for the first time (for any considerable business), they got as large a proportion of the grain as now, when they accept 12½ cents or less.

Atlantic receipts, though very large indeed and much larger than for any other week this year, were smaller than in the corresponding week and two other weeks in the spring of 1878. It was the first week of navigation fully open, however, and larger receipts may be expected directly.

Of the exports from New York for the week ending May 21, 80.3 per cent. of the flour, 47.8 per cent. of the wheat, and 25.5 per cent. of corn was carried out by steamers.

For the week ending June 3 (Tuesday), receipts and shipments at Chicago and Milwaukee were:

	Receipts.	Shipments.
Chicago	3,914,341	3,006,270
Milwaukee	708,160	806,000

The receipts at Chicago are the largest of the year, but much smaller than for the corresponding week last year. The shipments at both places are much smaller than the previous week.

Receipts and shipments at Buffalo for the same week were:

	Receipts.	Shipments.
By rail	929,400	1,058,805
By water	1,783,614	1,093,461
Total	2,713,014	2,152,266

Both lake and rail receipts are greater than for the corresponding week last year, and so are canal and rail shipments—canal shipments very little larger, rail shipments very much.

For the same week, the previous week and the corresponding week last year, receipts at the four leading Atlantic ports were:

	Week ending		
	June 3, '79.	May 27, '79.	June 2, '78.
New York	3,223,399	3,189,094	3,271,326
Philadelphia	1,583,400	1,087,300	1,463,600
Baltimore	850,367	774,702	779,480
Boston	392,700	339,250	502,900
The four	6,049,866	5,390,346	6,017,306

The total receipts have rarely if ever been exceeded in the spring months, and the Philadelphia receipts are, we think, the largest on record for a single week, in spite of which New York received 53¼ per cent. of the whole. Of the total New York receipts this year 1,743,686 bushels, or 54.1 per cent., arrived by rail, against 1,106,152 bushels, or 34.5 per cent., last year. Canal receipts *decreased* 28 per cent., and rail receipts *increased* 58 per cent. The effect of the very low rates is seen in this much more than in the lake and rail shipments from the Northwest, indicating that a large part of the lake shipments are by the propellers of the trunk lines.

Buffalo grain receipts for May and the five months ending May 31 are reported as follows by the *Commercial Advertiser* of that city:

	Flour		Grain	
Month:	1879.	1878.	1879.	1878.
By lake	70,221	132,511	7,020,824	9,444,878
By rail	98,400	77,800	3,689,900	2,688,300
Total	168,621	209,311	10,710,724	12,133,178
Season:				
By lake	70,221	170,454	7,020,824	15,893,352
By rail	538,400	202,800	17,246,300	12,090,600
Total	608,621	372,254	24,266,124	27,983,952

The season shows an increase of 63.5 per cent. in flour, and a decrease of 15.3 per cent. in grain. Rail receipts this season were 88.5 per cent. of the flour and 71.1 per cent. of the grain, against 54.5 per cent. of the flour and 43.2 per cent. of the grain last year. But the lake was open about twice as long last year.

For the five months shipments eastward of grain received by lake were:

	1879.	1878.	Decrease.	P.c.
By rail, bushels	2,172,134	2,862,147	690,013	24.1
By canal	6,506,621	13,000,401	6,493,780	49.9
Total	8,678,755	15,862,548	7,183,793	45.3
Per cent. by rail	75.0	18.0		

The canal opened May 8 in 1879 and April 15 in 1878, and the average shipments *per day* since the opening by canal were 361,615 bushels this year and 337,501 last year.

Baltimore grain receipts in May are reported as follows:

	1879.	1878.	Inc. or Dec.	P. c.
Flour, barrels	94,139	96,318	D. 2,179	2.3
Wheat, bushels	1,633,561	761,340	I. 872,221	114.6
Corn	2,435,855	2,736,031	D. 300,176	11.6
Other grain	203,212	122,332	I. 80,880	66.1
Total grain	4,272,628	3,619,703	I. 652,925	18.0
Total, flour reduced to wheat	4,743,323	4,101,293	I. 642,030	15.7

Receipts for the five months ending May 31 were as follows:

	1879.	1878.	Increase.	P c.
Flour, barrels	541,691	516,871	24,820	4.8
Grain, bushels	21,295,627	15,808,168	5,487,459	34.7
Total, bushels	24,004,082	18,392,523	5,611,559	30.5

May exports were 27,908 barrels flour and 4,682,456 bushels grain; stock in elevators May 31 was 229,814 bushels wheat and 410,661 bushels corn.

Coal Movement.

Coal tonnages reported for the week ending May 24 are as follows:

	1879.	1878.	Increase.	P. c.
Anthracite	512,251	220,359	291,892	132.4
Semi-bituminous	68,929	65,125	1,804	2.8
Bituminous, Pennsylvania	37,993	35,279	2,714	7.7
Coke, Pennsylvania	28,271	.. ...	.....	....

Reports continue that the Reading, the Delaware, Lackawanna & Western, the Delaware & Hudson, the Lehigh & Wilkesbarre Coal Companies, and most of the operators in the Lehigh Region have entered on a combination to force up the prices of anthracite.

The anthracite coal tonnage of the Belvidere Division, Pennsylvania Railroad, for the five months ending May 31 was as follows:

	1879.	1878.	Inc. or Dec.	P. c.
Coal Port for shipment	1,037	719	I. 318	44.2
South Amboy for shipment	190,914	191,982	D. 1,068	0.6
Local distribution on N. J. lines	134,073	65,762	I. 68,311	103.8
Company's use on N. J. lines	33,918	32,919	I. 999	3.0
Total	359,942	291,382	I 68,560	23.5

Of the total this year 271,351 tons were from the Lehigh, and 88,591 tons from the Wyoming Region.

Cotton.

For the week ending May 30 and nine months of the crop year then ending original receipts at shipping ports are reported as follows by the *Commercial and Financial Chronicle*, in bales:

	1879.	1878.	1877.	1876.	1875.
Week	17,113	18,220	9,669	13,810	11,789
Crop year	4,389,721	4,196,104	3,905,643	4,018,014	3,408,425

The receipts for the rest of the crop year are usually very light.

Erie Canal.

The business of the canal at Buffalo from the opening to May 31 is reported as follows:

	1879.	1878.	Decrease.	P. c.
No. boats cleared	838	1,904	1,166	61.4
Tolls received	$56,811	$137,516	$80,705	58.7
Av. receipts per day	2,470	2,926	456	15.6

The canal opened May 8 in 1879, and April 15 in 1878. A good deal of dried fruit, sugar and domestic cottons has gone from New York to Buffalo by canal this year, as well as the pig iron, rails, salt and anthracite coal which form the bulk of westward shipments and which the railroads do not so much compete for.

Rates to Missouri River Points and West.

The following is circular No. 174, issued May 31, by Albert Fink, Trunk Line Commissioner for the Trunk Line Executive Committee:

"Commencing Tuesday, June 3, 1879, and until further notice, the rates from New York to Missouri River points (Kansas City, Leavenworth, St. Joseph and Atchison) on freight destined to or through those cities, will be made by adding to the established rates from New York to East St. Louis, as per circular No. 172, the local rates from East St. Louis to the Missouri River points, as follows, viz.:

	1st class.	2d class.	3d class.	4th class.
From St. Louis city to Mo. River points	25 cts.	25 cts.	20 cts.	10 cts.
Bridge toll	5 "	5 "	5 "	5 "
	—	—	—	—
Total from East St. Louis to Mo. River points	30 "	30 "	25 "	15 "
From New York to East St. Louis	89 "	71 "	60 "	48 "
Total rate from New York to Mo. River points	119 "	101 "	85 "	63 "

"This total through rate must be maintained *via* 'all routes,' either *via* St. Louis city, East St. Louis, Hannibal or Chicago.

	1st class.	2d class.	3d class.	4th class.
Freight shipped *via* Hannibal will pay from New York to East Hannibal	91 cts.	73 cts.	61 cts.	49 cts.
Freight shipped *via* Chicago will pay the roads east of Chicago	75 "	60 "	50 "	40 "

"The division of freight to Missouri River points will be carried out as per agreement between the Chicago and St. St. Louis routes, and freight will be diverted from routes which do not maintain full tariff rates. The usual differences in rates between New York and other seaboard cities will be observed. All former circulars regarding 'Rates to Missouri River points' are hereby canceled."

RAILROAD LAW

Common Carriers—Special Contract.

In White against the Goodrich Transportation Co., the Wisconsin Supreme Court lately held:

1. The liability of a common carrier, as such, attaches to goods received by it for carriage from the time of such reception and while they remain in its warehouse before the carriage actually begins.

2. One who ships his own goods consigned to a person who has a special contract with the carrier for the carriage of goods at reduced rates at the owner's risk, and afterward accounts with his consignee for the freight charges paid by the latter on the goods at the reduced rates, will not be held to have ratified the contract as one for the carriage of goods at his risk, unless it appears that he had notice of such contract.

Duties and Obligations of Mortgagor—Conditions of Mortgage.

In the Macon & Augusta Company against the Georgia Railroad & Banking Company, appeal from Richmond Circuit on application for an injunction to prevent sale of road under mortgage, the Georgia Supreme Court has just decided as follows:

1. Where a mortgage to trustees provides for filling a vacancy in the trust by nomination by one of the beneficiaries, and approved by the Judges of the Superior Court, notice to the mortgagor of the application for approval is not required. The mode of appointment is governed by the instrument, and not by the general law.

2. When the principal debtor has, by mortgage, indemnified a guarantor of the debt, and the contract of guaranty has never been repudiated or sought to be evaded, but is recognized and, in part, performed, the mortgagor cannot avoid the mortgage by urging that the guaranty is not, and has never been, obligatory.

3. When a mortgage which purports on its face to be for the better securing of the due payment of certain bonds and obligations, and also for indemnifying the guarantor thereof, is sought to be enforced at the instance of the guarantor alone, the validity of its objects is not in question, except so far as the indemnity is concerned. Whether it might be enforced in behalf of the creditors, as well as in behalf of the guarantor, need not be decided.

4. A mortgage of a railroad to trustees, for the objects above specified, which gives them power to take possession of the road and use it in certain contingencies, and, at their discretion, on certain conditions, to sell it, contemplates that they may do either or both. The trustees need not confine themselves to either measure, but may first enter and then sell, using the road for the purposes of the trust until a sale is effected.

5. Under the special terms of the mortgage now for construction, default in paying the principal of the bonds is not a condition precedent to exercising the power of sale. It is enough that some of the coupons for interest have become due, and that the mortgagor, failing to pay them on demand, has continued in default for sixty days after receiving notice of the intention to sell.

6. With the bill, answers, and all the circumstances before him, the Chancellor was warranted in treating demand for payment, and notice of the intended sale, as sufficiently established.

7. Where a power of sale is to be exercised by a trustee in case of continued default for sixty days after notice to the mortgagor of an intention to sell, but not until the sale has been previously advertised for sixty days, the two periods are not synchronous, but successive; the term required for the advertisement to run does not begin until the term of the prescribed notice has expired.

8. A stipulation by a railroad corporation to appropriate certain bonds held by it on deposit to the completion of the railroad of another company, according to a prior contract and specifications made by a certain firm, "and all other work under said contract not by them fully performed," is not an undertaking to complete the railroad further than the bonds on deposit would pay for, or supply the means of payment. Nor is said stipulation an undertaking to keep down interest on outstanding bonds while the work of completion was in progress, though the firm had agreed to do so in the prior contract to which the stipulation makes reference.

9. For any breach of the foregoing stipulation, compensation may be had in damages, the corporation being solvent; and unless it appeared that such damages, together with the remnant of the bonds on deposit, would probably cancel the default for which the sale of the railroad under the mortgage is impending, the sale should not be enjoined. More especially is this true, as the mortgagor company, though bound to keep down the interest on its outstanding bonds, did not do so, but suffered the same to fall on the other company as guarantor, and hence is not in a favorable position to complain of any delay by the latter in prosecuting the unfinished work of construction.

10. As it is now certain that the mortgagor has had full notice of the intention to sell, and as the non-expiration of the term of notice before the property was advertised was the only meritorious ground of the bill, which ground has disappeared by lapse of time, let the sale, on being duly advertised for sixty days, proceed.

Judgment affirmed.

Right of Way—Measure of Damages.

In Justice against the Nesquehoning Valley Company, the Pennsylvania Supreme Court decided as follows:

A railroad company entered upon land without authority of law, and constructed its road and placed property thereon. In proceedings afterward to acquire title by eminent domain, *held*, that although the company entered upon the land as a trespasser, it did not thereby dedicate the property placed upon the land to the landowner, and that such property could not be included in estimating the damage.

THE SCRAP HEAP

Railroad Equipment Notes.

The Manchester (N. H.) Locomotive Works recently delivered seven locomotives to the Chicago, Burlington & Quincy, which has a great many engines from these works.

The Barney & Smith Manufacturing Co., at Dayton, O., is building four passenger, two sleeping and two parlor cars for the Chicago, Milwaukee & St. Paul road.

The Taunton (Mass.) Locomotive Works recently shipped two heavy mogul freight engines, with 18 by 26 in. cylinders, to the Atchison, Topeka & Santa Fe road.

The Johnson Railway Heater Co. has been organized at Putnam, Conn., with $300,000 capital stock.

The shop of the Altoona Car Co., at Altoona, Pa., was burned down May 24. The loss is estimated at $25,000; partly insured.

The Mason Machine Co., at Taunton, Mass., is building some locomotives for the Denver, South Park & Pacific road

The Atlantic & Gulf shops at Savannah, Ga., are building a number of fruit cars for the Florida Dispatch Line, to run between Cedar Keys and Savannah. They have double roofs and side ventilators, so arranged as to keep up a constant circulation of air.

The Erie (Pa.) Car Works are building 150 freight and several passenger cars for the Valley Railroad, of Ohio.

Iron and Manufacturing Notes.

The agreement of last year fixing the wages for puddling iron in Pittsburgh and the neighborhood at $5 per ton expired May 31. The manufacturers and men having failed to come to terms, no new agreement has been made, and work was generally suspended in the mills on June 2. The men demand the old price, but the manufacturers say that they cannot afford to pay $5 per ton while the work in other places is done at $3.50 or $4 per ton.

The blast-furnace of the Franklin Iron Co., at Franklin Furnace, Sussex County, N. J., which has been out of blast six years, is being repaired and made ready to start up. It is one of the largest furnaces in the United States.

Forsyth & Co., scale-makers at Rochester, N. Y., have lately put up five railroad track-scales.

The Crane Iron Co. has pulled down its No. 3 furnace, at Catasauqua, Pa., and is building a larger one in its place.

Montgomery Furnace, at Port Kennedy, Pa., is being made ready to go into blast.

The Glendower Iron Works, at Danville, Pa., are shipping iron rails to the Northern Pacific road.

The Pennsylvania File Works of McCaffray & Brothers, Philadelphia, have recently made considerable shipments of files to Europe.

The new rolling mill of the National Tube Works Co., at McKeesport, Pa., is finished, and the machinery is being set up.

Bridge Notes.

The Philadelphia Bridge Works of Cofrode & Saylor recently shipped 10 spans of iron railroad bridge to Cuba.

The Cleveland Bridge and Iron Co., of Cleveland, O., has filed articles of incorporation. The capital stock is to be $50,000.

The Portland Co., at Portland, Me., recently completed an

iron light-house, and is now building an iron pier for the government.

Prices of Rails.

Steel rails continue unchanged. Sales are light at present, mills being too full of work to take new orders except for future delivery.

Iron rails are in demand and prices firm. The latest quotations are $37 per ton at mill for 56-lbs. section. Prices are so high that negotiations are said to be in progress for one or two large lots from England.

Old iron rails are very scarce and prices are higher. Quotations are $22.50 to $23 per ton in Philadelphia, and $21.50 to $22.50 in Pittsburgh. Old steel rails at Pittsburgh (they are not usually quoted elsewhere) are $25 to $26 per ton.

Waste.

Private stockholders don't seem to have much show in the Chesapeake & Ohio Canal Company. At the last election the United States voted on 2,008 shares; the state of Maryland on 10,008; the corporation of Washington on 2,516, while the private stockholders rallied to the extent of no less than 18 shares.

"Is this sweet engaged ?" asked a young fellow of a young lady in a car. And he said it so handsomely and with such evident admiration that she took her bonnet-box off the seat and let him sit beside her. And—but we anticipate.—*Salem (N. J.) Sunbeam.*

One of the passengers on the Chicago, Burlington & Quincy Railroad last evening was a man from New Hampshire, going to Colorado for his health. The man weighed 110 pounds, his trunk weighed 86, and his lunch basket was four feet high and weighed 128 pounds. He was awful sick.—*Burlington Hawkeye.*

That lunch basket may look big to an unsophisticated Western editor, but it is a mere trifle to some that can be seen on the Coney Island or Rockaway boats these warm summer days. Why, when the deck hands want to trim the boat all they have to do is to shift one or two of those family lunch baskets from port to starboard.

Now is the season when the suburban resident walks down to the depot and finds the train has gone three minutes—time changed. The officers of the suburban lines out of New York seem to make tremendous efforts to prevent a copy of a new time-table reaching the public until at least a week after it has taken effect. They are generally successful, and for a week the public misses trains and indulges in unlimited profanity. One honorable exception must be noted in the case of the New Jersey Central, which is very accommodating in the matter of time-tables.

A Kansas Car-Load.

As persons desiring to come to Kansas may wish to know what a car-load is, and what it costs to get it here, we publish an inventory of the contents of a car taken from Morris, Ill., to Hays City for $85. A reliable gentleman informs us that there were stowed in that car two lumber wagons, two mules, one dog, a pump, a cooking-stove, 100 bushels of corn and oats, 500 feet of lumber, two beds, a barrel of flour, a barrel of kerosene, three men, 30 chickens and two horses.—*Atchison (Kan.) Champion, May 24.*

Fast Time.

One day this week the fastest traveling ever done on this end of the Pittsburgh, Fort Wayne & Chicago Railroad was accomplished between Rochester and Allegheny. When the Alliance accommodation train, with Tom Kennedy, engineer, and L. Shuster, conductor, arrived at Rochester, they found the Sharpsville accommodation delayed there, so they started on the latter's time. The run from Rochester to the outer depot in Allegheny, a distance of nearly 25 miles, was made in 24 minutes—at the rate of more than a mile a minute. The run from Sewickley to Emsworth was made in five minutes, and to the outer depot from Sewickley in 12 minutes. The train consisted of an engine and three coaches. The run was the subject of considerable discussion among the railroad men.—*Pittsburgh Telegraph, May 31.*

Fast Stock Train on the Pennsylvania.

A special train of 24 cars filled with live stock left this city at 2 o'clock Thursday morning, with engine 242, Engineer Trout and Conductor Edwards. The train arrived at Altoona at 8 and left at 9.07 a. m., with engine 455, in charge of Engineer John Meredith and Conductor Adams. The caravan was detained at Altoona for the purpose of putting a new truck under one of the stock cars. It arrived at Harrisburg at 2.20 p. m., thus making the run of 132 miles from Altoona in five hours and twelve minutes, and from Pittsburgh to Harrisburg, about 270 miles, in twelve hours. The train was run as a test against some of the northern trunk lines.—*Pittsburgh Telegraph, May 31.*

Just from Leadville.

A conductor on the Michigan Central road came across him the other day. The train, coming east, had just left Jackson, when the man from Leadville was discovered on the platform of the rear car. He seemed to have an object in being out there instead of in the car, but the conductor was deceived as to his motive. Conductors rarely ever get hold of the correct theory when they find a man with a long neck and a lean satchel sitting out on the rear platform.

"Trying to beat my way—great heavens ! but how can you say that ?" replied the man from Leadville to the conductor's brief but vigorous salutation. "No, sir-ee ! I came out here for fresh air. I've camped out so long that I'm sick as a hoss the minit I feel a roof over me. I'll be in in a minit and pay my fare to Detroit. I'm going up there to engage 1,700 men to return to Leadville with me."

The conductor suggested that he enter the car and pay his fare at once. Michigan railroad conductors don't seem to care a clam-shell whether a passenger hails from Leadville or Bungtown.

"Pay my fare to once—of course I will!" replied the man from Leadville. "The owner of the Huckleberry mine wouldn't look very well trying to beat a one-track railroad out of three or four dollars fare. I'll be in there in just a minit—just as soon as the gnawsus feelin' of the stummick is kinder gone. You'd better go in and git change for a $500 bill, so as not to detain me."

The conductor went back through the cars and returned. The owner of the Huckleberry mine was no longer on the platform, but was sound asleep in the centre of one of the coaches.

"Pay my fare !" he shouted, as the conductor gave him a vigorous shaking up. "Do you charge me double fare because I own the biggest and richest silver mine in Leadville? Am I to be imposed on because I am about to engage 1,300 laborers in Detroit, at $2 a day per man?"

"I want your fare," said the conductor.

"Want it twice over?"

"You haven't paid your fare yet, but you must or I shall put you off the train."

"I appeal to my fellow-passengers, I do!" exclaimed the man from Leadville; "even if I do own the Huckleberry mine, and a half interest in the Short-cake, I'm not to be swindled!"

"I give you one-quarter of a minute to pay your fare!" said the conductor, as he reached for the bell-rope.

"I'll pay," replied the man, after a few seconds; "I'll pay now, and sue the company when we reach Detroit. I'll have to pay you in silver bars, as I am short of gold coin and greenbacks."

He fished up his old satchel, took about four minutes to unlock it, and after a dive and a scramble he fished up two old paper collars, the remains of a shoe-brush, and an old darning-needle threaded with a foot or two of string.

"Come ! I'm in a hurry," said the conductor.

"I want this train searched; I've been robbed of over $3,000 worth of silver bars !" shouted the man from Leadville, turning the old satchel wrong side out and holding it up.

The train was stopped and he was ordered to alight. He looked from the big brakeman to the conductor, and sorrowfully remarked: "Yes, I'll dismount. I've been robbed, insulted and abused, and I want to sit down on a log and think it over and plan my revenge. The owner of the Huckleberry mine can't be stepped on with impunity, and you hear me !" The train started. As the last car reached him the Huckleberryian made a grab for the platform, missed the railing, and the last seen of him his feet were twinkling above the bullrushes of a roadside swamp. He had got a lift of 15 miles, and was doubtless perfectly satisfied.—*Detroit Free Press.*

OLD AND NEW ROADS.

Astoria & Winnemucca.—This company has filed articles of incorporation in Oregon for a line across that state, and to connect with a branch or extension of the Central Pacific. The capital stock is to be $3,000,000.

Boston, Concord & Montreal.—On June 1 this company made a reduction of about 25 per cent. in its local passenger fares. There has been heretofore much complaint about the fares and considerable pressure to secure a reduction.

Boston & New York Air Line.—At the annual meeting in Middletown, Conn., June 2, the stockholders voted to ratify the contract with the New York, New Haven & Hartford Company. The terms of this contract are stated as follows in the Air Line Company's annual report:

"1. The gross earnings of both companies are pooled, and our company receives as its share of the said pooled earnings 6 per cent. of the gross amount thereof.

"2. We retain the entire control of the operation and management of our own road, defraying the operating expenses out of our share of the said gross earnings.

"3. We are secured, without charge, all the facilities and privileges requisite for the efficient discharge of our freight and passenger traffic at the city of New Haven, on terms entirely satisfactory to the direction of this company.

"4. Our share of the gross receipts may be readjusted on the demand of either party on Oct. 1, 1880, by arbitration, the amount fixed by such arbitration to remain unchanged for the period of five years thereafter. At the expiration of five years the percentage may be in like manner readjusted by a further arbitration, and such readjustments may be had at the option of either party to the agreement at the expiration of any period of five years thereafter.

"5. Our company is only to be required to do local business.

"6. The agreement is to remain in force for the period of 999 years and eight months from Feb. 1, 1879, but is subject to the ratification of the stockholders of both companies, at their next annual meetings to be held after the making of said agreement."

This agreement shuts out the Air Line from all competition for the Boston-New York through business, but probably secures to it a larger revenue than it would be able to earn from any share of that business it might be able to secure.

Camden & Atlantic.—The twenty-fifth anniversary of the completion of this road was to be celebrated June 5, at Atlantic City, N. J., by an excursion, to which a large number of guests have been invited.

Chateaugay.—The contract for building this road has been let to Eder Brothers, of Bound Brook, N. J., who are to have it completed by Oct. 1, the company furnishing the rails. It will be 17 miles long, from Dannemora, N. Y., to Lyon Mountain, and is intended to reach the Chateaugay iron beds, the ore from which will be carried down to Lake Champlain at Plattsburg. The company has leased the Dannemora Railroad, as noted elsewhere.

Chicago, Pekin & Southwestern.—In the suits against this company the United States Circuit Court in Chicago, May 29, decided that the foreclosure suit of the Farmers' Loan and Trust Company having been sent back to the state court from this court under stipulation of the parties, it was competent for them to withdraw the application for removal to the Federal court, and for the state court to take jurisdiction again of the case.

In the United States Rolling Stock Company's suit, plaintiff having moved to dismiss the case in this court, and as it would be very much to the prejudice of all parties to have two suits pending in different courts, the suit was dismissed, with leave to plaintiff to file an intervening petition in the foreclosure suit in the state courts.

Cleveland, Tuscarawas Valley & Wheeling.—The money required to complete the extension of this road from Uhrichsville, O., to Bridgeport, opposite Wheeling, W. Va., has all been raised, preferred bonds to the amount of $700,000 having been placed. Work on the tunnel at Flushing was resumed several weeks ago, and a large force was to be put on the grading all along the line this week.

Columbus & Sunday Creek.—This road, formerly the Ohio Central, has been finally located from Bush Station, O., to Basil in Fairfield County, and the contractors have begun work. From Basil to the junction with the Pittsburgh, Cincinnati & St. Louis near Columbus the engineers are now at work. It is hoped that the entire line from Columbus to Ferrara can be completed by next fall.

Concord.—At the recent annual meeting of this company a statement was read by counsel for John H. Pearson, a stockholder who has suits pending against the company, charging that contracts had been made which were greatly to the disadvantage of the company and to the advantage of its northern connecting lines. It was also charged that dividends had been kept up by allowing the road to depreciate. There was also a lively debate on the local rates on freight and passengers, but no action was taken by the stockholders.

Cotton Plant.—Work is progressing on an extension of the Cotton Plant Railroad from Saulsburg to Cotton Plant, Ark., three miles, and it is to be completed by July 1. This will make the road 10 miles long, from Brinkley on the Memphis & Little Rock road, to Cotton Plant. The road is owned by Messrs. Gunn & Black, lumber manufacturers at Brinkley ; it is of 3 ft. 6 in. gauge, and has one locomotive.

Dannemora.—The State of New York, which built and owns this road, has leased it for 100 years to Thomas Dickson for account of the Chateaugay Railroad Company. By the terms of the lease, the lessee is to equip the road with rolling stock and keep it in first-class condition, and maintain the track in good order. For this the state is to receive free transportation of its freight between the state's prison and Plattsburg.

The road is of 3 ft. gauge and 17 miles long, from Plattsburg, N. Y., to Dannemora, and was built by the state last year to secure communication with the Clinton Prison. Mr. Dickson, the lessee, is President of the Delaware & Hudson Canal Company, and is also largely interested in iron manufacturing at Scranton. The object of the lease and of the proposed extension is to reach some large iron-ore beds.

Davenport & Northwestern.—The section of this road in Fayette County, Ia., has been seized by the sheriff under an attachment issued at the suit of Birch, Lakin & Co., former contractors. Trains at present are only run to Greeley, 97 miles from Davenport, leaving 31 miles of the road without accommodations.

Des Moines & Minneapolis.—Des Moines dispatches state that a controlling interest in this road has been sold to Boston parties represented by Mr. John B. Alley, and that work will be begun at once on the extension of the road northward. The road isof 3 ft. gauge, and is now in operation from Des Moines, Ia., northward to Callanan, 58 miles.

Evansville, Washington & Worthington.—This company has offered to build its road within one year, from Evansville, Ind., north by east to the Ohio & Mississippi at Washington, 55 miles, provided the city of Evansville will subscribe $100,000 to the stock, or to build the road and establish the repair shops at Evansville, provided the subscription is made $150,000. At a meeting held in Evansville, May 30, a large majority voted in favor of the proposition to subscribe $150,000 and secure the shops. The question will probably be submitted to popular vote shortly.

Illinois Midland.—Receiver Genis has been ordered to show cause why he should not be removed, at the instance of some of the creditors.

Indianapolis & Kansas City Short Line.—This is the name of the company organized to build the projected line from Decatur, Ill., west by south 85 miles to Roodhouse, to connect with the Chicago & Alton's Kansas City line.

Intercolonial.—A general cutting down is in progress on this road, especially in the station service. Offices are being consolidated, salaries cut down and expenses generally reduced as much as possible. The road has never earned its running expenses, and the new government managers want to make as good a showing as possible.

Jacksonville, Pensacola & Mobile.—In the suits against this company and the Florida Central, the United States Circuit Court has decided that the bonds held by the so-called Dutch bondholders are a prior lien to the claim of the Western North Carolina, Western Division Company, whose funds were fraudulently invested in the Florida lines. The Court fixes the claim of the Dutch bondholders at $2,750,000 on the Jacksonville, Pensacola & Mobile, and $197,000 on the Florida Central, with nine years' interest to be added to both sums. The claims of J. Gibbs, contractor, on the 25 miles of the Jacksonville, Pensacola & Mobile from Quincy to the Chattahoochie River, are reserved for further consideration. Notices of appeal have been filed.

Lake Erie & Louisville.—A controlling interest in this road has been sold to Eastern parties, who it is said, will at once extend the road to Muncie, Ind.

Louisiana Western.—This company, which is building the link in the New Orleans-Texas line between Vermillionville, La., and Orange, Tex., has now a large force at work grading its line and putting in pile bridges at the many river and bayou crossings. Track has been laid from a connection with the Texas & New Orleans at Orange northeast four miles, and a large lot of rails is on hand. Nearly five miles of trestle and bridge work are required in crossing the Sabine bottom, and all the timber used is cypress.

Louisville, Cincinnati & Lexington.—On the first day of October, 1877, this property was bid in at chancery sale by its present owners for its first mortgage bonds and some priorities aggregating in all $3,107,000, and the further sum of $731,000 for interest that had accrued thereon.

For this latter sum the purchasers gave twenty notes of $36,575 each, with individual security, bearing interest at 6 per cent., and maturing every three months, the last of which would have fallen due Oct. 1, 1882. These notes, however, were taken up considerably in advance of their maturity, and on the 26th day of May, 1879, there was paid into court the sum of $99,399.32 in full of the remaining notes, and discharging the obligation to the chancery court in twenty months, instead of the sixty months granted in the sale.

The prosperity and success that have attended this road since its reorganization has been remarkable and encouraging. In addition to discharging this chancery obligation in so short a period, it has retired $57,000 of its first mortgage obligation, added considerably to the value of the property in new cars and betterments on the road, and has relaid a considerable portion of the road with steel rails. As a result its securities have appreciated very rapidly, and its stock, which is held largely by a few parties, is thought by some familiar with the road to bid fair to became a very profitable investment.

Louisville & Nashville.—The authorities of Louisville, Ky., have decided to sell the city stock in this road, which is 18,500 shares. Hardin County, Ky., and Davidson County, Tenn., have also decided to sell their stock, about 6,500 shares, making 25,000 shares to be put on the market. After this news was received in New York the price fell at once about one-tenth.

Macon & Augusta.—The Georgia Supreme Court has affirmed the judgment of the Circuit Court and refuses to grant the injunction against the sale of this road under the second mortgage held by the Georgia Railroad Company. The trustees under the mortgage can now proceed to sell the road on giving 60 days' notice. The court holds that the only defect in the prior proceedings in the case was the failure to give formal notice of intention to sell to the mortgagor company and that defect is now cured.

Madeira & Mamore.—A dispatch from London, May 30, says : "The Lord Justices of Appeal have reversed the decision of the British Chancery Court, rendered April 24, in the suit between the bondholders of the National Bolivian Navigation Company of the United States and the contractors for building the Madeira & Mamore Railway, involving the sum of £800,000. The effect of this decision is that the £800,000, after the deduction of the expenses of the litigation, will be distributable among the bondholders. The nominal value of the bonds is £1,650,000. The respondents will now carry the case to the House of Lords."

On this the Philadelphia *Times*, generally well informed as to the affairs of this road and its contractors, comments as follows: "The case referred to in the above dispatch is that of Wilson vs. Church, in which the plaintiff, on behalf of himself and other bondholders of the Bolivian loan, sought to have distributed among them a trust fund amounting to over £800,000, part of the proceeds of the loan, which, under the contract of the Messrs. Collins, was to be applied

to the construction of the Madeira & Mamore Railway. The case was argued before Mr. Justice Fry, who, on April 24 last, delivered a judgment dismissing the action with costs and declaring the fund applicable only to the construction of the works as they proceed. London dispatches by Associated Press, affecting monetary interests, are always to be taken with caution, and it is probable that the above dispatch exaggerates the effect of yesterday's decision. It was understood here that the question submitted to the Justices of Appeals was simply whether the Court was right in nonsuiting the plaintiffs, or whether they ought not to be allowed an appeal, and it is likely that the present decision goes no further than this."

Manhattan Elevated.—This company took formal possession of the Metropolitan and the New York Elevated roads on June 5. The leases, which have been approved by the stockholders of both companies, are dated back to Feb. 1. In addition to the terms of the leases already published, it is stated that, in payment for the extension and completion of the roads, the New York Company pays to the Manhattan Company $3,000,000 in money, and the Metropolitan pays $3,500,000 in money and $2,500,000 in first-mortgage bonds.

Work is actively in progress on the large depot and shops of the New York road on Third avenue. The buildings cover an entire block of land and will be fully equipped for the repair of old and the building of new equipment.

The extension of the Metropolitan road is now completed up Ninth avenue to One-hundred and Third street, and will be opened for travel next week. A large part of this extension is owned jointly by the two companies.

It is stated that the Metropolitan East Side Line will be completed at present only as far as Fifty-ninth street on Second avenue. Its extension above that point will depend upon the demands of the business.

Milwaukee, Lake Shore & Western.—Work is progressing steadily on the extension of this road from Clintonville, Wis., northward. Track is laid five miles, to Honey Creek, where the track-layers are waiting for the completion of a bridge. It is expected that trains will run to Perry's Mill in Waupaca County by July 4.

Nashua & Lowell.—At the annual meeting last week it was voted to authorize the directors to issue notes or bonds of the company for a period not exceeding 20 years and at a rate of interest not exceeding 5 per cent., for the purpose of funding the floating debt and providing for any existing liabilities of the corporation.

Nashville & Florence.—Lawrence County, Tenn., has voted to subscribe $50,000 to the stock of this company, which is building a narrow-gauge road from Columbia, Tenn., southwest by Lawrenceburg to Florence, Ala., about 70 miles.

New York & Oswego Midland.—In the United States Circuit Court in New York, May 30, some of the creditors moved for an order to modify the decree of sale so as to give their claims precedence over other debts of the Receivers. They also asked for a reference to ascertain what amount the Receivers have spent for permanent improvements, and how much present holders of certificates paid for them.

Northern (New Hampshire).—At the recent annual meeting Judge Minot, for many years a director and Treasurer, stated that there was no foundation for current reports of disagreements in the board. The only subject of argument had been on the election of a successor to the late Mr. Stearns, the Concord directors urging that a resident on the line should be chosen instead of a Boston man.

A resolution prohibiting free passes was introduced and, after some debate, referred to the board.

Ohio & Mississippi.—The New York *World* reports that the main points in the plan of reorganization lately submitted to the board are as follows: Five coupons of the second mortgage, including that of April, 1879, to be funded, and payment on this mortgage to be resumed in October. Interest on the firsts, it may be mentioned, is now paid up to date. The floating debt to be made up as of April 1, 1879, and extended at 7 per cent. interest over four years, in notes at three months, and intervals of three months up to 48 months. The Springfield Division bonds to be reduced from $3,000,000 to $1,250,000. The scheme, to make it binding, must have the assent of 75 per cent. of the second mortgage, 90 per cent of the debentures and $250,000 of the floating debt.

Omaha & Northern Nebraska.—This company offers to extend its road from Tekamah, Neb., northward to Logan Valley and Decatur on condition that Burt County shall exchange the $60,000 bonds voted some years ago, and bearing 8 per cent. interest for $96,000 new bonds to be issued bearing 4 per cent. interest. By the old contract the company has still two years in which to build through the county.

Pennsylvania.—Argument in the Junction Railroad was heard by the United States Circuit Court in Pittsburgh last week. As already noted, the action is brought to prevent the Pennsylvania Railroad Company from hindering the transfer of cars between the Philadelphia, Wilmington & Baltimore and the Reading road, in order to prevent a connection between the Baltimore road and the New Line to New York. About a mile of the Junction road is owned absolutely by the Pennsylvania, and it is the free use of this mile which the plaintiffs in this suit desire to secure. The Court reserved its decision.

Pennsylvania Company.—At the annual meeting in Pittsburgh, June 3, the stockholders voted unanimously to ratify the new or amended leases of the Ashtabula & Pittsburgh, the Northwestern Ohio and the Indianapolis & Vincennes roads. The last named is a new lease; the others are modifications of leases made necessary by the reorganization of the companies owning the roads.

Philadelphia & Reading.—This company's statement for April and the five months of its fiscal year ending April 30, is as follows:

	April.		Five months.	
Gross receipts:	1879.	1878.	1879.	1878.
Railroad traffic..	$989,034	$903,765	$4,415,131	$3,862,198
Canal traffic.....	78,942	56,599	163,807	76,393
Steam colliers...	54,507	28,117	281,004	224,390
Richmond barges	20,401	2,548	40,821	26,776
Total R. R. Co..	$1,142,884	$991,029	$4,900,763	$4,189,757
Coal & Iron Co..	857,789	486,756	3,169,059	2,227,997
Total.....	$2,000,673	$1,477,785	$8,069,822	$6,417,754
Traffic:				
Passengers carried.....	556,135	512,139	2,494,015	2,454,936
Tons merchandise	368,304	284,546	1,392,945	1,284,169
Tons coal.....	716,320	408,620	2,660,682	1,690,393
Tons coal on colliers.....	53,849	34,714	232,435	206,607
Tons coal mined:				
By Coal & Iron Co.....	373,041	189,683	1,378,656	803,753
By tenants.....	107,207	80,151	433,652	295,480
Total.....	480,248	270,134	1,812,308	1,099,233

For April the receipts of the railroad company show an increase of $151,855, or 15.3 per cent., and those of both companies an increase of $522,888, or 8.6 per cent. For the five months the railroad company alone shows a gain of $711,006, or 17.0 per cent., and both companies a gain of $1,652,068, or 25.7 per cent. Passenger and freight business showed an increase, but the chief gain was on coal.

Philadelphia & Atlantic City.—Argument was heard by the Chancellor of New Jersey last week on the motion to vacate the order of sale of this road, and decision reserved. It is probable that the order will be vacated, if the parties interested will advance the money to pay off the labor claims, under which the sale was ordered.

Pittsburgh, New Castle & Lake Erie.—A special meeting of the stockholders was held in Pittsburgh last week to consider the question of issuing $175,000 bonds to meet the floating debt and complete the extensions now under construction from Zelienople, Pa., to Martinsburg, and from Etna to Allegheny. It was resolved to appoint a committee of five to examine into the affairs of the company and report as to the necessity of issuing the bonds. This committee will report at an adjourned meeting.

Port Royal & Augusta.—The long bridge over the Savannah River near Augusta, Ga., has been entirely rebuilt. There are six fixed spans of 150 feet each and a draw-span 203 feet long. One of the fixed spans is a Pratt truss of iron, the others are Howe truss of wood, with arch braces. The piers are of masonry. The trestle approach on the Carolina side, 1,500 feet long, is now being rebuilt.

Rochester & Irondequoit.—This company has let the contract for building its road to George H. Thompson, who is to begin work at once. The road will be about eight miles long, from Rochester, N. Y., to Irondequoit Bay on Lake Ontario.

St. Louis & Southeastern.—The sale of Tennessee Division under foreclosure has been confirmed by the Court. It was bought, it will be remembered, for account of the Louisville & Nashville Company.

Savannah & Charleston.—In the matter of the appeal of the bondholders from an order of the Circuit Court authorizing the Receiver to make certain expenditures for the repair of the road and the purchase of new equipment, the South Carolina Supreme Court has set aside the order appealed from, on the ground that it was improperly granted, without full investigation and hearing. The Court further, after hearing the full case on appeal, says that an early sale of the road is practicable and desirable, and remands the case to the Circuit Court for that purpose, without prejudice to the rights of parties to apply to the Court for prudential orders to maintain the efficiency of the service and traffic of the road until such sale can be effected.

Securities on the New York Stock Exchange.—The following securities have been placed on the lists at the New York Stock Exchange:

Louisiana & Missouri River, second-mortgage bonds, guaranteed by Chicago & Alton. Amount $300,000.

Columbus, Chicago & Indiana Central, certificates of bondholders' committee for consolidated first-mortgage bonds deposited and assented to the agreement.

South Carolina.—Receiver Fisher makes to the United Sta es Circuit Court of the earnings of the road from Oct. 1, 1878, to March 31, 1879, a period of six months:

Passengers	$96,266.40
Freight	539,104.90
Mail, express, etc.	13,986.74
Total ($2,683 per mile)	$649,358 04
Expenses (47.74 per cent.)	310,000.84
Net earnings ($1,402 per mile)	$339,357.20

The Receiver's balance sheet, condensed, on March 31 was as follows:

Earnings	$649,358.04
Accounts and balances due	14,665.26
Total	$664,023.30
Expenses	$310,000.84
Sundry accounts receivable	32,445.63
Balance, cash on hand	321,576.83
	664,023.30

The report covers the best part of the year for business.

Southern Minnesota.—It is stated that the Chicago, Milwaukee & St. Paul Company has acquired a controlling interest in this road, which is a valuable feeder to its La Crosse Division, to which most of its east-bound business has always gone. It is not understood that any lease or consolidation will be made. The Southern Minnesota is now completed for 218 miles westward from La Crosse, and a further extension is in progress.

Texas & St. Louis.—A correspondent writes as follows: "This company is now on its feet (it is the successor of the Tyler Tap), and a contract for grading the first section, from Texarkana to Sulphur River was let on Monday, May 26. The balance, from Sulphur to Big Sandy (where line joins the old Tyler Tap already built), will be let in a few days. We hope to commence tracklaying at Taxarkana July 1. Two corps of engineers are in the field, making final location of route. Gov. Hubbard is soliciting aid along the line from Tyler to Corsicana and Waco, and is meeting with such success that there remains little doubt but that we shall continue on to Waco at once. Distance by proposed line, Texarkana to Waco, 230 miles, about."

Tide-Water Pipe Line.—This line is now completed from Coryville, Pa., on the McKean & Buffalo road, to Williamsport, about 100 miles, and the first oil was pumped into it May 28. It is designed to be an independent line, and will deliver its oil at Williamsport to the Philadelphia & Reading road. It is of six-inch pipe and has an estimated capacity of 6,000 barrels a day. There are two pumping stations, one at Coryville and one at a point 22¼ miles east. The line has been an expensive one to build, passing over a rough and hilly country, to and through which the transportation of the pipe was costly and troublesome.

Union Pacific.—A hearing was held last week before the Massachusetts Supreme Court upon a bill in equity brought by the Union Pacific Railroad Company against the Credit Mobilier of America, praying that the latter may be enjoined from prosecuting a suit now pending in the Supreme Court for Suffolk County on a note for $2,000,000 made by the Union Pacific Railroad Company payable to the Credit Mobilier, and also to restrain the respondent from prosecuting a suit to recover $1,994,709.96, which amount the directors of the Union Pacific voted to be due to the Credit Mobilier on Jan. 31, 1876. The complainant claims that the charges of the Credit Mobilier were excessive, unjust and unreasonable. The respondents allege that when the Credit Mobilier was organized, the fact that it had been organized was well known to the Union Pacific stockholders, all of whom had an opportunity to take the risks and enjoy the profits; and that at that time the stockholders of the two corporations were nearly the same, but that great changes have since been made in the stock of both companies. It is further claimed that this suit is brought by Jay Gould, who at the time of the occurrence of these transactions had no interest in the Union Pacific road, but since obtained the controlling interest, and now, in order to maintain the action, sets up a fraudulent claim.

Utah & Northern.—Work was recently resumed for the season on this road, and last week the grading was completed for 20 miles and track laid seven miles northward from the late terminus at Snake River, Idaho. The end of the track is now 214 miles northward from the junction with the Union Pacific at Ogden, Utah.

Utah Southern.—The track on this road is now laid to Chicken Creek, Utah, 30 miles southward from the late terminus at York, and 105 miles from Salt Lake. Trains will run next week to the new terminus. This extension completes the Utah Southern road, and at Chicken Creek the work will be taken up by the Utah Southern Extension Company, a distinct organization, but controlled by the same persons. Contracts for grading on the extension have already been let, including the heavy work through Sevier Cañon.

Vicksburg, Shreveport & Texas.—The late decision of the Circuit Court, made in accordance with the decree of the United States Supreme Court, while setting aside the sale by which the road passed for a time into the possession of the North Louisiana & Texas Company, allowed that company the amount of $391,959.40 for improvements made while in possession of the property. Suit has now been begun by the state of Louisiana to attach this fund and prevent its payment to the company, on the ground that the state issued certain bonds to the North Louisiana & Texas Company, taking stock in return. The sole consideration for the issue was the title of the company to the road, and as that has been adjudged fraudulent and void, the state now claims a lien on this money found to be due for improvements, which is the only asset of the North Louisiana & Texas Company. An injunction has been issued to prevent any payment until the suit is decided.

The road will probably be sold under the first mortgage shortly. The bondholders are to meet at Macon, Ga., June 9, to consider what action to take, and it is thought probable that they will decide to buy in the road. Whether they will be willing or able to complete it to Shreveport is entirely uncertain.

Washington City, Virginia Midland & Great Southern.—The suits against this company came before the Circuit Court at Alexandria, Va., May 27, upon a petition of the Baltimore & Ohio, praying for a sale of the road. The petition was accompanied by a statement of the desire of the Baltimore & Ohio that some fair scheme might be adopted which would secure this valuable property to its creditors upon such terms as would be just to all and favorable to the future welfare of the road. The suggestion was accepted and it was arranged to call a general meeting of bondholders.

The meeting will be held in Baltimore, June 26, and holders of all classes of bonds are requested to be present.

Waxahachie Tap.—Eight miles of grading on this Texas road are now finished and track-laying has been begun.

West Chester & Phœnixville.—This company offers to build its road from West Chester, Pa., north by east to Phœnixville, about 15 miles, provided the people of West Chester will take $75,000 in bonds of the company.

Western Union.—The hearing on the application for a receiver has been postponed to June 9. This has been done with the understanding that a proposition for settlement with the bondholders is under discussion.

Wisconsin Central.—At the annual meeting last week it was announced that by the consent of all parties a receiver had been appointed for the Milwaukee & Northern road (as we have heretofore noted), and that the old lease of the road had been canceled. An arrangement has been made with the Receiver, by which the Trustees in possession of the Wisconsin Central will continue to operate the Milwaukee & Northern road as heretofore, but under a new agreement.

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Scioto Valley.

This company owns a line from Columbus, O., to Portsmouth, 100 miles. The following statement is for the year ending Dec. 31, 1878, the first in which the whole line was worked, 50 miles having been opened in March, 1877, and the rest in January, 1878.

The traffic for the year was as follows:

	Miles.	Av. rate per mile.
Passenger mileage, through	412,741	2.600 cts.
" " local	3,719,347	2 530 "
Total	4,132,088	2.521 cts.
Tonnage mileage through	244,301	1.380 "
" " local	6,160,864	2.735 "
Total	6,405,165	2.068 cts.

Of the tonnage mileage 78.8 per cent. was of northward, and 21.2 per cent of southward bound freight. The traffic was equivalent to 57 passengers and 87.74 tons of freight carried each way daily over the whole length of the road.

The earnings for the year were as follows:

Freight	$171,883
Passengers	104,178
Express, mail and miscellaneous	6,092
Total ($2,821.53 per mile)	$282,153
Expenses (55.39 per cent.)	156,276
Net earnings ($1,258.77 per mile)	$125,877

The result is very good for the first year's operation of a new road.

Leavenworth, Lawrence & Galveston.

This road was worked during the year 1878, which is covered by the latest report, by Mr. B. S. Henning as Receiver in a foreclosure suit, the property consisting of the road owned, from Lawrence, Kan., to the southern line of the state, 143 miles; the leased Kansas City & Ottawa road from Olathe, Kan., to Ottawa, 32 miles, and the leased Southern Kansas road, from Cherryvale, Kan., to Independence, 10 miles, making 185 miles in all. Since the close of the year the company has been reorganized as the Kansas City, Lawrence & Southern, and the leased lines consolidated with it.

The traffic for the year was as follows:

Train mileage:	1878.	1877.	Inc. or Dec.	P.c.
Passenger	123,228	.....	.....	....
Freight	130,199	.....	.....	....
Service and switching	66,895	.....	.....	....
Total	320.322	.....	.....	....
Passenger mileage	2,758,525	2,464,636	I. 293,889	11.9
Tonnag miles	8,688,406	7,254,055	I. 1,434,351	2.0
Average train load:				
Passengers, No.	22.39	.....	.....	....
Freight, tons	66.73	.....	.....	....
Per pass. per mile:				
Receipt	4.48 cts.	4.99 cts.	D. 0.51 ct.	10.2
Cost	3.79 "	4.93 "	D. 0.14 "	3.5
Per ton per mile:				
Receipt	3.00 "	3.41 "	D. 0.41 "	11.7
Cost	2.03 "	2.24 "	D. 0.21 "	9.4

The tonnage mileage for 1878 includes 929,603 ton-miles of company's freight. Locomotive service cost 15.76 cents per mile run.

The earnings for the year were as follows:

	1878.	1877.	Inc. or Dec.	P. c.
Passenger	$123,761.38	$113,716.08	I. $10,045.30	8.8
Freight	269,923.23	238,155.74	I. 22,767.49	9.6
Other	54,919.65	58,465.01	D. 3,545.36	6.1
Total	$439,604.26	$410,336.83	I. $29,267.43	7.1
Expenses	281,339.09	265,970.90	I. 15,368.19	5.8
Taxes	43,209.53	40,801.00	I. 2,408.53	5.9
Total	$324,548.62	$306,771.90	I. $17,776.72	5.8
Net earnings	$115,055.64	$103,564.93	I. $11,490.71	11.1
Gross earn. per mile	2,376.24	2,218.03	I. 158.21	7.1
Net earn. per mile	621.92	559.81	I. 62.11	11.1
Per cent working exps.	64.00	64.80	D. 0.80	1.2
Per cent of all expenses	73.83	74.77	D. 0.94	1.3

By direction of the Court earnings of the three lines have also been kept separately, and the division between them is as follows:

	Gross earn.	Net earn.	Gross earn. per mile.	Net earn. per mile.	Per ct. of exps.
Leavenworth, L. & G.	$343,343	$92,980	$2,401	$650	72.99
Kan. City & S. F.	79,525	17,929	2,485	560	77.48
Southern Kan.	16,736	4,138	1,674	414	75.44
Total	$439,604	$115,056	$2,376	$622	73.83

The Land Department reports that the land grant is in all 242,349 acres, of which 165,074 acres have been sold, 22,647 acres in 1878. Total receipts on land contracts have been $382,865.44, of which $45,476.57 was received in 1878. The amount outstanding on land contracts Dec. 31 was $238,536.03. The expenses of the Land Department last year were $16,495.60; total expenses to Dec. 31, 1878, were $353,464.17, showing net receipts of $29,401.27 from land.

The Receiver's balance sheet is as follows, condensed:

Audited vouchers		$2,655.10
Balance to debit Receiver on L. L. & G.		32,651.95
Unpaid taxes for 1878, not due till June, 1879		24,242.25
Profit and loss		503,231.81
Total		$562,781.11
Assets, county bonds, bills receivable, etc.	$75,470.86	
Trustees, in trust for bondholders	157,000.00	
Permanent improvements and equipment.	114,734.95	
Charles Merriam, Agent L. L. & G.	4,000.00	
Supplies and receivables	83,300.11	
Cash balance	128,275.19	
		562,781.11

By order of the Court, made at the request of the principal bondholders, the Receiver was directed to spend the money on hand to put the road-bed in first-class condition and to replace the old wooden bridges on pile foundations with iron bridges on masonry supports, and to keep the amount so expended as a special renewal account, independent of the ordinary operating expenses. The expenses so incurred and charged to permanent improvements, have been $92,233.27, chiefly for bridges and road-bed, including filling of trestle bridges, changing grades, etc.

Mobile & Montgomery.

This company owns a line from Montgomery, Ala., southwest to Mobile, 179 miles. The present company came into possession of the road in 1874, through a foreclosure sale; its latest report is for the year ending Dec. 31, 1878.

The bonded debt consists of $260,000 old bonds, subject to which the road was sold. The rest of the former bonds are represented by stock of the new company.

The freight traffic for the year was as follows:

	1878.	1877.	Inc. or Dec.	P. c.
Tonnage-mile., north.	9,042,117	7,924,015	I. 1,118,102	14.1
" " south.	10,333,040	13,099,381	D. 2,766,341	21.2
Total	19,375,157	21,023,396	D. 1,648,230	7.8
Av. rate per ton per mile	2.25 cts.	1.91 cts.	I. 0.34 cts.	17.8

The decrease in traffic was in south-bound business, on which rates were lowest. The average freight rate shows a considerable increase.

The earnings for the year were as follows:

	1878.	1877.	Inc. or Dec.	P. c.
Freight	$435,841	$402,553	I. $33,288	8.3
Passengers	198,847	212,843	D. 13,996	6.6
Express, mail, etc	45,495	50,641	D. 5,146	10.4
Total	$680,183	$666,037	I. $14,146	2.1
Expenses	421,703	441,476	D. 19,683	4.5
Net earnings	$258,390	$224,561	I. $33,829	15.1
Gross earnings per mile	3,800	3,721	I. 79	2.1
Net " " "	1,444	1,255	I. 189	15.1
Per cent. of expenses	62.01	66.28	D. 4.27	6.4

The expenses of 1878 include, as did those of 1877, many heavy and unusual outlays made to the permanent improvement of the roadway, bridges, rolling stock, etc.

The income account is as follows:

Net earnings		$258,390
Taxes	$24,721	
Expenses bondholders' committee	31,472	
Interest and exchange	19,694	
Dividend No. 2	74,624	
Supplies bought but not used	5,864	
New freight depot at Mobile	16,194	
		172,569
Balance for the year		$85,821
Balance from previous year		17,050
Balance Jan. 1, 1879		$102,871

From this another dividend of 3½ per cent. has been paid since the close of the year.

In reviewing the course of the company's business during his term of office, the President says: "It is very gratifying, in looking back at the results of your business since Nov. 26, 1874, to see that there has been an almost steady increase in receipts up to the present time, only excepting the three yellow-fever months of 1878. By comparing the receipts of January, 1875 ($52,593), January, 1876 ($64,078), January, 1877 ($63,596), January, 1878 ($75,770), and January, 1879 ($80,869), it will be seen that, with one exception, there has been a steady increase in the business of this month; and the business of the other months will show, with very few exceptions, a similar increase from year to year. I therefore think it but reasonable to look forward to the gross receipts of your road, during the current year, amounting to at least $700,000."

Kentucky Central.

This company owns a line from Covington, Ky., opposite Cincinnati, southward to Lexington 99 miles. It controls and works the Maysville & Lexington, Northern Division, from Paris Junction northeast to Maysville 49 miles, but the accounts of that line are kept separately. The statements given below are from the report for the year ending April 30, 1879, as presented at the recent annual meeting.

During the year 43 shares of common stock have been issued in exchange for old Covington & Lexington stock under the compromise agreement in the Bowler suit.

The earnings for the year were as follows:

	1878-79.	1877-78.	Inc. or Dec.	P.c.
Passengers	$161,973	$197,689	D. $35,716	18.1
Freight	354,987	416,418	D. 61,431	14.7
Express and mails	32,084	32,603	D. 519	1.6
Miscellaneous	4,345	1,632	I. 2,713	166.2
Total	$553,389	$648,342	D. $94,953	14.6
Expenses	344,639	401,648	D. 57,009	14.2
Net earnings	$208,750	$246,694	D. $37,944	15.4
Gross earnings per mile	5,590	6,549	D. 959	14.6
Net " "	2,100	2,492	D. 393	15.4
Per cent. of expenses	62.28	61.95	I. 0.33	0.5

Interest on bonded debt was $72,800, leaving a net balance of $135,950. The loss in earnings comes, doubtless, from the completion of the Cincinnati Southern's nearly parallel line. The report says:

"These figures show a decrease in the gross earnings, compared with the previous year, of $94,953. They also show a decrease in expenses of $57,009, so that the decrease in gross earnings has been largely contracted by the large decrease in expenses.

"The road-bed, superstructure, etc., have received all needed attention and are in excellent condition; and there will be needed during the coming year only the usual quantity of new rails and cross-ties to keep the road up to its present high standard.

"The Maysville & Lexington Railroad, Northern Division, continues to be a valuable feeder to our road. The extension of the Pound Gap road to Hillsboro, a distance of 17 miles from Johnson Station, on the Maysville & Lexington, will add to its value in that respect, as the greater portion of freight which comes to the Maysville Division from the Pound Gap road is brought to Cincinnati over the Kentucky Central, and we have reason to believe that business from that source will steadily increase. The Kentucky Central continues to operate the road between Paris and Maysville under an arrangement that has proven mutually advantageous. * * * *

"The board has not yet taken any active measures to extend the road to the Ohio River under the authority given by the City Council of Covington last year, unexpected obstacles having been encountered. The company has three years from date of grant within which to make the extension. Neither are they prepared to submit to the stockholders any recommendations for an extension of the road southwardly.

"Notwithstanding the fact that the business of the road during the year failed to realize fully our expectations, we are gratified with being able to report that out of the earnings of the road two dividends have been declared, one in November last, the other this month, aggregating $2 a share on the common stock and $6 a share on the preferred stock."

Columbus & Toledo.

This company owns a line from Columbus, O., to Wallbridge, 118.2 miles, and it leases from the Pennsylvania Company the use of 5.5 miles, from Walbridge to Toledo, making 123.7 miles worked. It owns valuable docks at Toledo. The road is an extension of the Columbus & Hocking Valley, having the same management and nearly the same ownership. Its second annual report is for the year ending Dec. 31, 1878.

The equipment consists of 11 locomotives; 10 passenger and 4 baggage cars; 179 box, 50 stock, 66 platform and 601 coal cars. Two locomotives, 25 box and 364 coal cars were added during the year. More equipment is needed and will be bought during the current year.

The general account is as follows:

Stock ($7,590 per mile)		$897,107.62
Bonds ($20,457 per mile)		2,416,000.00
Stock installment interest scrip		27,608.20
Accounts, balances and bills payable		202,151.60
Contingent account		28,051.69
Total		$3,570,919.11
Road and property ($29,216 per mile)	$3,453,304.01	
Supplies, accounts, etc.	84,622.51	
Cash	32,992.59	
		$3,570,919.11

The bonds are all 7 per cent. first-mortgage bonds; their amount was increased $73,000 during the year. The bills payable ($191,707.77) are chiefly real estate notes running 10 years.

The traffic for the year was as follows:

	1878.	1879.	Inc. or Dec.	P. c.
Locomotive mileage	416,530	324,660	I. 91,870	28.3
Pass. car mileage	531,889	579,120	D. 47,231	8.2
Freight car mileage	6,315,697	2,708,719	I. 3,606,978	133.2
Passengers carried	145,283	150,922	D. 5,639	3.7
Passenger mileage	4,570,485	4,095,555	I. 474,930	11.6
Tons freight carried	345,605	175,485	I. 170,120	96.9
Tonnage mileage	36,340,392	19,953,318	I. 16,390,074	82.2
Average receipt:				
Per passenger per mile	2.53 cts.	2.80 cts.	D. 0.27 ct.	9.6
Per ton per mile	1.04 "	0.99 "	I. 0.05 "	5.1

Of the tons carried, 64.5 per cent. was coal and 17.5 per cent. lumber. The average freight car load was 5.756 tons.

The earnings for the year were as follows:

	1878.	1877.	Inc. or Dec.	P. c.
Passengers	$115,839.25	$115,011.41	I. $827.84	0.7
Freight	379,702.89	197,779.72	I. 181,923.17	92.0
Other sources	22,329.09	18,091.15	I. 4,237.94	23.4
Total	$517,871.23	$330,882.28	I. $186,988.95	56.5
Expenses	295,612.59	211,279.72	I. 84,332.87	39.9
Net earnings	$222,258.64	$119,602.56	I. $102,656.08	85.8
Gross earnings per mile	4,186.50	2,987.65	I. 1,198.85	40.1
Net earnings per mile	1,790.76	1,079.93	I. 710.83	66.8
Per cent. of expns.	57.08	63.85	D. 6.77	10.6

In 1877 the road was only partly worked, not being finished and accepted till July, though trains ran to Toledo in January. Passenger service was thoroughly organized sooner than freight.

The contingent account was as follows:

Net earnings for year		$222,258.64
Interest on funded debt	$164,381.78	
" " floating debt	8,729.59	
Rent of Pennsylvania Company's track	21,095.58	
		194,206.95
Balance, Dec. 31		$28,051.69

The result of the first full year's operation of the road has been very favorable.

By resolution of the board the interest allowed on installments of stock paid up was terminated Feb. 1, 1879. By previous agreement this interest was to be paid in scrip payable from the net earnings of the road before any dividend. Most of the old stock has been surrendered and full-paid certificates issued, with the amount of scrip due on each.

Columbus & Hocking Valley.

This company owns a main line from Columbus, O., southeast to Athens, 76 miles; the Straitsville Branch, from Logan to New Straitsville, 13 miles; the Monday Creek Branch, from Nelsonville to Greendale, 12 miles; the Snow Fork Branch, from Bessemer to Orbiston, 4 miles; making 105 miles in all. The Monday Creek Branch was extended from Grafton to Greendale, 5 miles, during the year. The report is for the year ending Dec. 31, 1878.

The equipment consists of 31 locomotives; 8 passenger, 1 combination and 3 baggage cars; 100 box, 100 flat, 1,006 coal and 17 caboose cars. Two engines and 100 coal cars have been added since the close of the year. There are also on the road 738 coal cars owned by coal operators.

The general account is as follows:

Stock ($19,335 per mile)		$2,030,150.00
Bonds ($23,810 per mile)		2,500,000.00
Renewal account		72,000.00
Contingent account		455,630.53
Bills, accounts and balances payable		93,530.14
Total		$5,151,310.67
Construction and equipment ($46,770 per mile)	$4,910,870.12	
Sinking funds	159,900.00	
Cash and receivables	80,540.55	
		$5,151,310.67

Of the bonds $1,800,000 are first and $300,000 second mortgage; all bear 7 per cent. interest. Stock was increased $18,550 during the year.

The traffic for the year was as follows:

	1878.	1877.	Inc. or Dec.	P. c.
Locomotive mileage	725,074	682,514	I. 42,560	6.2
Passenger car mileage	339,827	319,363	I. 20,464	6.4
Freight car mileage	9,925,948	8,535,690	I. 1,390,258	16.3
Passengers carried	138,372	139,445	D. 1,073	0.8
Passenger mileage	3,093,905	3,228,815	D. 134,950	4.2
Tons freight carried	1,049,319	899,407	I. 149,912	16.7
Tonnage mileage	63,317,069	55,960,540	I. 7,456,529	13.3
Average receipt:				
Per passenger per mile	2.80 cts.	2.80 cts.	.. ..	...
Per ton per mile	1.19 "	1.29 "	D. 0.10 ct.	7.8

Average mileage per engine was 23,390 miles; the highest mileage made by any engine was 38,291 miles. Of the tons carried, 87.9 per cent. was coal. The coal tonnage was: 1878, 913,907 tons; 1877, 800,795; 1876, 782,316; 1875, 753,016.

The earnings for the year were as follows:

	1878.	1879	Inc. or Dec.	P. c.
Passengers	$86,940.38	$90,262.82	D. $3,322.44	3.7
Freight	756,507.90	720,932.85	I. 35,575.05	4.9
Other sources	28,104.88	17,704.13	I. 10,400.75	58.8
Total	$871,553.16	$828,899.80	I. $42,653.36	5.1
Expenses	480,425.73	471,143.87	I. 9,281.86	2.0
Net earnings	$91,127.43	$357,755.93	I. $33,371.50	9.3
Gross earnings per mile	8,544.64	9,313.48	D. 768.84	8.3
Net earnings per mile	3,822.82	4,019.73	D. 196.91	4.9
Per cent. of expenses	55.22	56.84	D. 1.62	2.9

The Monday Creek and Snow Fork branches were not in use until just at the close of 1877, so that the average mileage that year was much less than last. Earnings were reduced by the lower rates forced by greater competition.

The contingent account was as follows:

Balance from 1877, less February dividend		$326,865.25
Net earnings for 1878		391,127.43
Total		$717,992.68
Interest, funded debt	$174,965.00	
" floating debt	6,191.15	
Dividends, 8 per cent	162,412.00	
		343,568.15
Balance to 1879		$373,242.52

The balance shows a gain of $47,559.28 over the previous year. Dividends of 4 per cent. each from the year's profits were paid Aug. 12, 1878, and Feb. 10, 1879.

During the year 700 tons of steel rails were laid, and since Jan. 1 the balance necessary to renew the main line to Athens has been put down, so that the Main Line and Straitsville Branch are now all laid with steel.

The Monday Creek Branch will be extended five miles further, to a junction with the Straitsville Branch, when the business will justify the outlay.